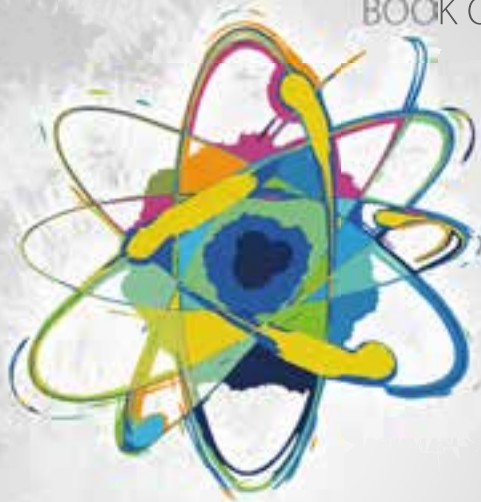


# PROGRAMME BOOK OF ABSTRACTS

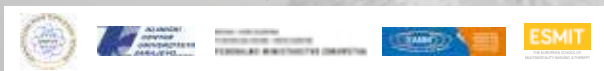


## 7<sup>th</sup> BALKAN CONGRESS OF NUCLEAR MEDICINE

SARAJEVO  
HOTEL HOLIDAY

9<sup>th</sup> - 12<sup>th</sup> MAY 2018

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Association of Nuclear Medicine of the Federation of Bosnia and Herzegovina  
Bolnička 25, 71000 Sarajevo, Bosnia and Herzegovina

**Amela Begić, MD, PhD, Professor**

Telephone: +387 33 298 338, E-mail: [nuk.medicina@kcus.ba](mailto:nuk.medicina@kcus.ba)

**Zvezdana Rajkovača, MD, PhD, Professor**

Address: Dvanaest beba bb 78 000 Banja Luka, Bosnia and Herzegovina

Telephone: +387 51 34 28 00, E-mail: [zvezdana.rajkovaca@kc-bl.com](mailto:zvezdana.rajkovaca@kc-bl.com)

## TECHNICAL ORGANIZER

A.T.I. International Events, Conference and Association Management – A.T.I. d.o.o. Sarajevo,  
Karađorđeva 21, 71000 Sarajevo, BiH

**Sponsorship contact**

Vesna Borisavljević, E-mail: [vesna@ati.ba](mailto:vesna@ati.ba)

**Registration and Accommodation contact**

Predrag Marinković, E-mail: [predrag@ati.ba](mailto:predrag@ati.ba)

# INVITATION .....

**Dear colleagues and friends,**

On behalf of the Association of Nuclear Medicine of Federation of Bosnia and Herzegovina it is my great pleasure and honor to invite you to the 7<sup>th</sup> Balkan Congress of Nuclear Medicine that will be held in Sarajevo 9 – 12<sup>th</sup> May 2018 at hotel Holiday.

The congress will gather a large geographically diverse group of participants from the Balkan countries, countries around and beyond. The focus will be the latest and relevant topics in the field of Nuclear Medicine and Molecular Imaging.

.....

Other than multimodality imaging we will also go back to basics and bring back conventional nuclear medicine as "*An old lady in new clothes*".

The main goal of the congress is to present the latest achievements and developments in clinical nuclear medicine, science and technology to physicians, physicists, chemists, technicians, scientists and all the other experts who work in this important field.

We hope to see you there.

Sincerely yours,

President of the Congress  
Amela Begić, MD, PhD, Professor

# CHALLENGES .....

To further improve general Nuclear Medicine  
To improve connections with Clinical Disciplines

# FOCUSES .....

1. Endocrinological Diagnostics and Therapy
  - Thyroid gland
  - Prostate cancer – theranostic
2. Pulmonary embolism and beyond
  - Quantitative VP SPECT as a primary tool for diagnosing PE and choice of treatment
  - Importance of follow up patients with PE with VP SPECT to establish duration of therapy
  - Importance of Ventilation SPECT to diagnose other cardiopulmonary diseases beyond PE

# PROGRAMME .....

## 09.05.2018., Wednesday

16:00-18:00 Registration

18:00-18:30 Opening ceremony

### SESSION 1 INVITED SPEAKERS

18:30-18:45 Challenges in V/P SPECT, continuing after 40 years , Marika Bajc

18:45-19:00 The challenges of Nuclear Medicine educations, How to harmonize Nuclear medicine in Europe, Lorenzo Mafiolli

19:00-19:15 Increased patient participation through better education on nuclear and radiological examinations; Ronald W.J. van Rheenen

19:15-19:30 Quality Assurance in the NM department, Martin Lema

19:30-19:45 Preclinical studies in development of therapeutic radiopharmaceuticals - the critical approach for successful clinical application, Emilija Janevik

19:45-20:00 PET/MRI Clinical application, Dinko Francheski

**20:00 Welcome reception**

## 10.05.2018., Thursday

### SESSION 2 THYROID GLAND part 1

**Chairpersons: Nejra Latić, Jasna Mihailović, Ioanis Iakovou**

09:00-09:10 Diagnosis and management of thyroid nodules - thyroid cancer overdiagnosis, Maja Franceschi

09:15-09:25 Thyroid Scintigraphy an always modern Lady, Savvas Frangos

09:30-09:40 Role of SPECT-CT Images in the Management of Thyroid Disorders", Sonya Sergieva

09:45-09:55 Parathyroid scintigraphy in patients with primary hyperparathyroidism, Silvija Canecki Varžić

10:00-10:15 Discussion

**10:15-10:45 Coffee break**

### SESSION 3 THYROID GLAND part 2

**Chairpersons: Sonya Sergieva, Savvas Frangos, Maja Franceschi**

10:45-10:55 Management of differentiated thyroid cancer-facts and controversies, Jasna Mihailović

11:00-11:10 Diagnostic and therapeutic modalities in patients with refractory DTC, Elma Kučukalić-Selimović

11:15-11:25 Personalized approach in tailoring radioiodine therapy for thyroid cancer, Ana Ugrinska

11:30-11:40	PRRT in patients with iodine-negative thyroglobulin-positive thyroid cancer, Marina Vlajković
11:40-11:55	Discussion

## **SESSION 4      TECHNOLOGY, RADIOPHARMACY AND PHYSICS**

**Chairpersons:** **Martin Lema, Adnan Beganović, Nusret Salkica**

11:55-12:05	Current Good Manufacturing Practice with integrated Building Management System in the production of PET Radiopharmaceuticals, Emilija Janevik
12:10-12:20	Development of the method for bio-analysis of 68Ga-PSMA-11 in patient blood, Aljoša Stanković
12:25-12:45	Advances in SPECT Reconstruction algorithms, improving the image quality, Martin Lema
12:50-13:10	Current State and Future Challenges in Quantitative Imaging for Dosimetry in Radionuclide Imaging and Therapy, Karin Knesaurek
13:15-13:25	Patient doses in nuclear medicine, Adnan Beganović
13:30-13:40	SUV pitfalls after FDG administration, Nusret Salkica
13:45-14:00	Discussion

**14:00-15:00      Lunch**

**15:00-17:00      Poster presentations**

**15:00-17:00      Meeting of the representatives from the Balkan countries**

## **11.05.2018., Friday**

### **SESSION 5      LUNGS**

**Chairpersons:** **Lorenzo Maffioli, Medzida Rustempašić, Alden Begić,**

09:00-09:20	V/P SPECT and Importance of follow up patients with PE and beyond, Marika Bajc
09:25-09:35	Lung function measures and their correlations in V/PSPECT of COPD patients, Ari Lindqvist
09:40-09:50	MSCT in acute PE, Spomenka Kristić
09:55-10:05	Acute VTE: new aspects of treatment, Mirza Dilić
10:10-10:20	Immunotherapy in non small cell lung Cancer: Current status, Timur Cerić
10:25-10:35	Prophylaxis of VTE in Cancer Patients, Alden Begić
10:35-10:50	Discussion

**10:50-11:20      Coffeebreak**

### **SESSION 6      NEUROLOGY (and extra)**

**Chairpersons:** **Andreas Fotopulos, Sabina Dizdarević, Raluca Mittitelu,**

11:20-11:30	When to perform 18F-FET PET/CT in patients with gliomas, Marina Hodolić
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11:35-11:45	Radionuclide brain perfusion & metabolism imaging in the diagnosis of dementia, Qaisar Siraj
11:50-12:00	PET/MRT a new promise imaging modality in comparison with PET/CT, Elena Piperkova
12:00-12:10	Planar Bone Scan vs.SPECT vs. SPECT/CT in Spinal Lesions, Daniela Miladinova
12:10-12:20	Complementary information of coronary artery calcium obtained from CTAC scans in hybrid SPECT/CT imaging, Venjamin Majstorov
12:20-12:35	Discussion

## **SESSION 7 THERANOSTIC part 1**

**Chairpersons:** **Mahmut Yuksel, Marina Garcheva, Omer Ugur**

12:35-12:45	The role of nuclear medicine in diagnostic and treatment of prostate cancer, Dražen Huić
12:50-13:10	Theranostic management of prostate cancer in Germany", Peter Barteinstein
13:15-13:25	F Choline PET CT. How useful is it, Rak Gantra
13:30-13:40	Radium-223-dichloride: A smart bullet for prostate cancer treatment and the first proof of principle for alpha targeted treatments, Sabina Dizdarević
13:45-13:55	Theranostics and Molecular Radiotherapy for Metastatic Prostate Cancer, Bengul Gunalp
13:55-14:10	Discussion

## **14:10-15:20 Lunch**

## **SESSION 8 THERANOSTIC part 2**

**Chairpersons:** **Dražen Huić, Marina Hodolić, Fani Bozgurt**

15:20-15:40	Theranostics with PSMA ligands in prostate cancer, Zehra Ozcan
15:45-15:55	Theranostic of Prostate Cancer with Radiometallic Agents, Adriano Duati
16:00-16:20	PET/CT in gastro-esophagial cancers, Omer Ogur
16:25-16:35	Unresectable liver tumors: Y-90 microspheres therapy, Vassilios Prassopoulos
16:40-16:50	Comparison of imaging methods for diagnosis and follow-up of bone metastases, Marina Garcheva
16:55-17:10	Discussion

**18:30 Departure for the dinner with sightseeing of Sarajevo**

**20:00 Congress dinner**

**23:00 Return to hotel Venue**

**12.05.2018., Saturday**

**SESSION 9**

**Chairpersons:**

**NET and Endocrinology**

**Bengul Gunalp, Timur Cerić, Ivan Mihaljević**

09:00-09:20

Is there still a role for somatostatin receptor scintigraphy in the PET/CT era,  
Vera Artiko

09:25-09:35

The Impact of Molecular Imaging in Decision-Making of Therapeutic Options  
for Neuroendocrine Tumors, Fani Bozkurt

09:40-09:50

PET imaging of Diabetic Foot, Dinko Franceschi

09:55-10:10

Discussion

**SESSION 6**

**Chairpersons:**

**Cardiology**

**Mirza Dilić, Maria Koutelou, Elena Piperkova**

10:10-10:20

Myocardial perfusion imaging in the evaluation of patients with diabetes  
mellitus, Raluca Mititelu

10:25-10:35

Role of FDG PET/CT in diagnosis and follow up of Endocarditis,  
Dragana Šobić Šaranović

10:45-11:05

Courage, Fame and Death – CARDIOLOGY, Pushan Bharadwaj

11:05-11:15

The assessment of viable myocardium with 99mTc MIBI SPECT in patients with  
dilated cardiomyopathy, Amra Čičkušić Jakubović

11:20-11:30

Regadenoson: A new stress test agent for Myocardial Perfusion Imaging,  
Maria Koutelou

11:30-11:45

Discussion

**12:00**

**Closing ceremony**

# LIST OF ACCEPTED POSTERS .....

**P001**

Regadenoson myocardial perfusion imaging: Performance and safety profile based on 1-year institutional experience in Greece.

**P002**

The relationship between illness perception and quality of life in thyroid patients who received radioiodine ablation treatment

**P003**

THE EFFECTS OF 131-I-MIBG THERAPY IN ADVANCED MEDULLARY THYROID CARCINOMA

**P004**

2-[18F]FLUORO-2-DEOXY-D-GLUCOSE PRODUCTION: CORRELATION BETWEEN YIELD AND EOB ACTIVITY

**P005**

VALIDATION OF CHEAP, FAST AND EFFICIENT METHOD FOR DETERMINATION OF KRYPTOFIX IN [18F] FDG RADIOPHARMACEUTICAL USING IODINE VAPOURS

**P006**

WHO REALLY NEEDS BONE SCINTIGRAPHY IN INITIAL STAGING AMONG THE PATIENTS WITH NEWLY DIAGNOSED PROSTATE CANCER

**P007**

Effective dose of for medical workers during Y-90 microspheres radioembolization

**P008**

The contribution of 18F-FDG-PET/CT in restaging testicular cancer patients

**P009**

Evaluation of solid pulmonary nodules with dual time point 18F-FDG-PET/CT. Preliminary data

**P010**

Hybrid In-111-Octreotide SPECT/CT imaging in neuroendocrine tumors:

**P011**

The value of hybrid In-111-Octreotide SPECT/CT imaging in neuroendocrine tumors

**P012**

IMPACT OF F18-FDG PET/CT IN MANAGEMENT OF mRCC - SINGLE INSITUION EXPERIENCE



**P013**

PET-CT FINDINGS IN HEPATIC EPITHELOID HEMANGIOENDOTHELIOMA

**P014**

PET CT total body scan - a case of respiratory image misregistration

**P015**

POSITRON EMISSION TOMOGRAPHY IN A PUBLIC HEALTH SYSTEM IN REPUBLIC OF MACEDONIA - OUR EXPERIENCE

**P016**

THE ROLE OF 18F-FDG PET/CT IN DETECTION OF RECURRENCE IN EPITHELIAL OVARIAN CANCER PATIENTS WITH HIGH CA-125 LEVEL

**P017**

Vitamin D deficiency and calcium in osteoporotic patients

**P018**

SUBACUTE (DE QUERVAIN'S) THYROIDITIS (SAT) – WHAT DID WE LEARN FROM 40 YEARS FOLLOW-UP?

**P019**

CHALLENGES IN ESTABLISHMENT OF CYCLOTRON AND PET/CT UNIT IN THE REPUBLIC OF MACEDONIA

**P020**

THYROID MALT LYMPHOMA - CASE REPORT

**P021**

MR

**P022**

CONTRIBUTION OF FDG PET IMAGING IN THE DETECTION OF UNDERLYING CARCINOMA IN A WOMAN WITH NONSPECIFIC MASTITIS

**P023**

CLINICAL SIGNIFICANCE OF [18 F]FDG UPTAKE ON PET/CT IMAGING IN TERMS OF RECURRENCE OR RESIDUAL DISEASE IN PATIENTS WITH COLORECTAL CANCER

**P024**

THE ROLE OF THE HYBRID IMAGING TECHNIQUES SPECT-CT AND PET-CT IN THE THERAPY ALGORITHM OF PATIENTS WITH SOMATOSTATIN EXPRESSING TUMORS

**P025**

DEVELOPMENT OF THE METHOD FOR BIO-ANALYSIS OF 68GA-PSMA-11 IN PATIENT BLOOD

**P026**

SOLITARY FIBROUS TUMOR OF MEDIASTINUM AND F-18 FDG PET/CT: A CASE REPORT

**P027**

USE OF PARKINSON'S DISEASE RELATED PATTERN IN A PATIENT WITH ATYPICAL CLINICAL PRESENTATION OF PARKINSON'S DISEASE

**P028**

Role of FDG-PET/CT in Primary Central Nervous System Lymphomas: Contribution to Patient Management as a Prognosticator

**P029**

High metabolic tumor volume and total lesion glycolysis derived from baseline 18FFDG PET/CT may predict the metabolic abnormalities in newly diagnosed cancer patients

**P030**

Technetium-99m-dimercaptosuccinic acid renal scintigraphy in children with congenital hydronephrosis

**P031**

Comparison of SUV max values obtained from 18F-FDG PET/CT and cell-free DNA levels measured from plasma in oncology patients

**P032**

SENTINEL LYMPH NODE STATUS VS TUMOR CHARACTERISTICS - PROGNOSTIC FACTORS FOR

**P033**

IS THE TIRADS SCORE ASSOCIATED WITH A SCINTIGRAPHIC ANALYSIS PREDICTOR OF THE PRESENCE OF THYROID CANCER?

**P034**

IS THE TIRADS SCORE ASSOCIATED WITH A SCINTIGRAPHIC ANALYSIS PREDICTOR OF THE PRESENCE OF THYROID CANCER?

**P035**

Our Experience with DaTscan

**P036**

ATR-IR AND RAMAN SPECTROSCOPIC CHARACTERIZATION OF p-SCN- Bn-DTPA AND p-SCN- Bn-1B4M-DTPA TRASTUZUMAB CONJUGATES

# POSTER ABSTRACTS .....

## **P001**

Regadenoson myocardial perfusion imaging: Performance and safety profile based on 1-year institutional experience in Greece.

Authors: Koutsikos J, Angelidis G, Velidaki A\*, Vogiatzis M, Ilia E, Zaxaki S., Mamarelis I\*\*, Lazaridis K\*\*, Zafeirakis A, Demakopoulos N

E-mail: [jtkoutsik@yahoo.gr](mailto:jtkoutsik@yahoo.gr)

Department of Nuclear Medicine, Army Share Fund Hospital,\* Department of Nuclear Medicine, Laiko General Hospital, \*\*Department of Cardiology, Army Share Fund Hospital. Athens, Greece

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**Background / Aims:** Regadenoson is a selective A2A adenosine receptor agonist recently approved for clinical use in Greece. Similarly to other adenosine receptor agonists, regadenoson may cause several side-effects after its administration in patients undergoing regadenoson myocardial perfusion imaging (MPI). We investigated the performance and safety profile of regadenoson MPI based on our 1-year institutional experience.

**Methods:** We enrolled 133 consecutive patients (82 males, 51 females, mean age 69.6 y.o) referred to the Department of Nuclear Medicine at the Army Share Fund Hospital (417 NIMTS), Athens, Greece, for a clinically indicated pharmacological stress MPI. All participants were  $\geq 20$  years of age without meeting any of the contraindications to regadenoson administration.

18 patients suffered from chronic obstructive pulmonary disease (COPD). All participants underwent regadenoson stress test, combined with both stress and rest MPI. Data on the symptoms and electrocardiographic changes, observed due to regadenoson administration, were recorded. Symptoms were graded as 1-mild: a symptom that did not distress the patient, 2-moderate:

a symptom that distressed the patient but it was self-limiting, or 3-severe: a symptom that distressed the patient requiring medical intervention

**Results:** 80 patients had abnormal MPI studies. Regadenoson-related symptoms were reported in 79 patients. The three most common symptoms were dyspnea (38/133), discomfort (20/133), and dizziness (17/133). The severity of symptoms was recorded as grade 1 in 41 patients, grade 2 in 37 patients, and grade 3 in 1 patient. Two or more different symptoms were reported in 38 patients. Ischemic electrocardiographic changes and arrhythmias were observed in 14 patients.

**Conclusions:** Our findings support previously published data regarding the safety profile of regadenoson MPI. Symptoms were common, but transient, requiring medical intervention in only one case. Dyspnea was found to be the commonest side-effect; however, the procedure was well tolerable, even in COPD patients.

## **P002**

The relationship between illness perception and quality of life in thyroid patients who received radioiodine ablation treatment

Authors Akyildiz G, Elboga U, Sayiner ZA, Elboga G

E-mail: [umutelboga@hotmail.com](mailto:umutelboga@hotmail.com)

Gaziantep

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**Aim:**We aimed to evaluate this on Turkish thyroid cancer patients who had radioiodine treatment after total thyroidectomy.

**Methods:**A total of 100 patients were recruited in this cross-sectional study. Patients' age, educational level, marital status and disease characteristics including stage, treatment and follow-up period since diagnosis were noted. Short Form 36 Health Survey Questionnaire, The Illness Perception Questionnaire was used to assess the quality of life and illness perception, respectively. Statistical significance of the associations were analyzed using Shapiro-Wilk Test, Student's t, Mann Whitney u, and ANOVA tests.

**Results:**The mean age of patients enrolled in the study was 40.62. There were 84 (84.0%) female and 16 (16.0) male cases. 72 cases reported that they experienced loss of strength, 60% of whom associated the symptom with disease. When we correlated the illness perception sub-scales and quality of life dimensions in our study, the most apparent negative correlation was seen between the immunity dimension of the disease sub-scale and quality of life sub-dimensions. There was also a negative and significant ( $p<0.05$ ) correlation between the dimensions of ability to understand the disease and overall health; emotional representations dimension, and vitality and overall health dimensions under quality of life, and causes of the disease and all sub-dimensions of quality of life.

**Conclusion:**The fact that the patients believe that their body resistance is low have a remarkably lower quality of life, and patients' ability to understand the disease is strikingly low clearly show the effect of the way of perception of illness in patients on the quality of life.

## **P003**

### **THE EFFECTS OF <sup>131</sup>I-MIBG THERAPY IN ADVANCED MEDULLARY THYROID CARCINOMA**

Authors: Mihaljević I, Šnajder D, Topuzović N, Wagenhofer V, Kralj T, Mudri D, Mijatović K.

E-mail: [ivanm2712@gmail.com](mailto:ivanm2712@gmail.com)

Clinical Institute of Nuclear Medicine and Radiation Protection, University Hospital Osijek, Croatia.

Faculty of Medicine Osijek, Josip Juraj Strossmayer University of Osijek, Croatia.

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**Aim:** The effects of <sup>131</sup>I-metaiodobenzylguanidine (MIBG) therapy on the survival of patients with advanced medullary thyroid carcinoma (MTC) were investigated. Long-term survival of patients with disseminated MTC remains largely unsatisfactory mainly because current irradiation and chemotherapy treatment commonly fails to defeat the disease. <sup>131</sup>I-MIBG may provide additional therapeutic benefits. **Methods:** Therapeutic doses of 100 mCi (3.7 GBq) <sup>131</sup>I-MIBG were administered by slow i.v. infusion to 7 patients (5 female and 2 male aged 18 to 80 years) with proven disseminated MTC. All patients underwent a total thyroidectomy and selective neck dissection prior to the treatment, and distant metastases were diagnosed. The total therapeutic doses the patients received ranged from 3.7 to 18.5 GBq of <sup>131</sup>I-MIBG in 3 months to 1.5 years intervals. All patients tolerated the treatment well. Tumor marker levels (calcitonin-hCt, carcinoembryonic antigen-CEA, neuron specific enolase-NSE, chromogranin A-CgA, pro-gastrin releasing peptide-pro-GRP) were measured before and after therapy. Whole body scintigraphy performed after the therapy showed indication of metastatic disease. **Results:** In four patients we observed a decrease in hCt level, in one case the decrease lasted for 6 months, and in one patient the increase in hCt level appeared 10 months after the therapy, and in one patient no lung metastases were visible on whole body scan after the second <sup>131</sup>I-MIBG therapy. Other two cases showed a significant decrease in tumor marker levels only after the neck dissection, but after that further dissemination was observed. **Conclusion:** The effects of hCt tumor marker levels reduction after <sup>131</sup>I-MIBG therapy in patients were temporary and individual. MTC metastases can be partially reduced in certain cases.

According to our experience, the objective response to <sup>131</sup>I-MIBG therapy is limited, but it can improve patient survival.

**Main topic:** 1. Endocrinological Diagnostic and Therapy **Key words:** medullary thyroid carcinoma, I-<sup>131</sup>-MIBG therapy

## **P004**

### **2-[18F]FLUORO-2-DEOXY-D-GLUCOSE PRODUCTION: CORRELATION BETWEEN YIELD AND EOB ACTIVITY**

Authors: Chochevska M., Atanasova Lazareva M., Kolevska K., Velichkovska M., Jolevski F., Razmoska J., Doslakoski N., Filipovski Z., Nikolovski S., Zdraveska Kocovska M., Janevik Ivanovska E.

E-mail: [maja.cocevska@ugd.edu.mk](mailto:maja.cocevska@ugd.edu.mk)

University Institute for Positron emission tomography, Skopje, Republic of Macedonia

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2-[18F]fluoro-2-deoxy-D-glucose ([18F]FDG) production is a routine synthesis process, involving fully automated synthesizer with single-use disposable system - integrated fluidic processor (IFP cassette) and overall synthesis time of 30 minutes. The synthesis of [18F]FDG is a six-step process consisting of two chemical reactions, a nucleophilic 18F- fluorination followed by a base-catalyzed hydrolysis. 18F- is produced by irradiating enriched [18O]-water with protons with GE PETtrace 16.5 MeV cyclotron, at University Institute of Positron Emission Tomography, Skopje.

The amount of starting radioactivity depends on the desired radioactivity of final product, so because of that, our objective was to determine whether amount of starting radioactivity affects the radiolabeling efficiency and the capacity of starting materials or the production yield. Forty batches of [18F]FDG were produced with same IFP cassette and the same reagent kit (different batch production but same producer).

The mean decay corrected production yield for [18F]FDG produced by starting radioactivity of 18F- from 20-35 GBq, 55-75 GBq and 150-170 GBq were 71,44%  $\pm$  5,5%, 70,13%  $\pm$  5,5% and 67,11%  $\pm$  2.3%, respectively. The results confirm that the starting radioactivity of radioisotope does not affect the production yield and there is no significant difference between the results in these three groups of results,  $p > 0.05$  (0.069). [18F]FDG was successfully synthesized with a production yield above 60% in all batches, as result of the high-quality and the large capacity of starting materials for radioactivity to give efficient radiochemical synthesis.

## P005

### VALIDATION OF CHEAP, FAST AND EFFICIENT METHOD FOR DETERMINATION OF KRYPTOFIX IN [18F] FDG RADIOPHARMACEUTICAL USING IODINE VAPOURS

Authors: Jolevski F, Velichkovska M. , Atanasova Lazareva M. , Chochevska M. , Kolevska K. , Janevik Ivanovska E.

E-mail: [filip.jolevski@ugd.edu.mk](mailto:filip.jolevski@ugd.edu.mk)

University Institute for Positron emission tomography, Skopje, Republic of Macedonia

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The commonly used phase transfer catalysts in production of 18F-Fludeoxyglucose ([18F]FDG) is Kryptofix 222. Because of its toxicity, quality control is performed before the administration of this radiopharmaceutical, to be sure that the limit concentration is not reached and the preparation is safe for administration in patients.

Our purpose was to optimize a method using iodine vapours for determination of Kryptofix 222 that is cheaper, faster and reliable than the method described in monograph of [18F]FDG in European Pharmacopoeia, to prove its specificity and determine the limit of detection (LOD).  
Materials and equipment: Silica Gel TLC plates, iodine ACS, Kryptofix standard, saline, Water type 1, standards of FDG, CLDG and FDM, Glucose, pipettor, tips, glass chamber.

In our TLC procedure 4 µl of solution was applied to silica gel TLC, and after drying the plate was exposed to iodine vapours for 5 min in a chamber.

For determination of the specificity we prepared two matrix solutions that contained FDG, FDM, CIDG and glucose dissolved in saline (Matrix 1) and water type 1 (Matrix 2). There was no significant coloration/discoloration when they were compared with saline/water type 1. The spot with Kry dissolved in Water Type 1 was more intensive compared with Kry dissolved in saline. For more comparable conditions to our product of synthesis, in the following steps in determining the LOD, Kry standard solutions were prepared in saline. LOD for this method was 6.125 µg/ml. When we applied different series of produced FDG from period of 6 months we confirmed that quantity of Kry was significantly below the determined LOD of this method.

A cheap, fast, easy to handle, efficient spot-test method for semi-quantitative analysis of Kry was optimized and validated for specificity and LOD, and can be used in routine analysis of our production of FDG radiopharmaceutical.

## **P006**

### **WHO REALLY NEEDS BONE SCINTIGRAPHY IN INITIAL STAGING AMONG THE PATIENTS WITH NEWLY DIAGNOSED PROSTATE CANCER**

Authors: Ljiljana Jaukovic, Marija Radulovic, Sanja Dugonjic, Marija Sisic

E-mail: [lilaj2805@gmail.com](mailto:lilaj2805@gmail.com)

Institute of Nuclar Medicine, Military Medical Academy, Crnotravska 17, Belgrade, Serbia

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We included 818 patients with previously untreated prostate cancer (PCa) who underwent bone scintigraphy at a single institution between 2010 and 2017.

The purpose of this study was to determine whether serum prostate specific antigen (PSA) and total Gleason score (GS) on biopsy can predict osseous metastases and eliminate the need for a bone scan as a routine procedure in initial staging.

Methods: Logistic regression models were used to test the relationship among the available predictors and bone metastases on scintigraphy.

Results showed that 182 of all bone scans (22.3%) were positive for metastases. This proportion was significantly higher in patients with PSA>20ng/mL (41.8%) vs. PSA<10ng/mL (9.5%). The proportion of positive

scintigraphy findings was significantly lower in patients with GS≤6 (12.9%) vs. GS≥9 (49.4%). There was no statistically significant difference in age between patients with bone metastases (BM) vs. patients with no BM ( $P > 0.05$ ). In univariate analysis, PSA level ( $p < 0.001$ ) and biopsy Gleason score ( $p < 0.001$ ) were strongly correlated with bone scan positivity. PSA level >20ng/mL enhanced the chances of metastatic bone involvement by 6.8 fold using the PSA<10ng/mL as the referent category.

Similarly, patients with GS≥9 had 6.6 fold more chances to show bone metastases than patients with GS≤6. On multivariable analysis, increasing PSA level ( $p < 0.001$ , OR 2.37; CI: 1.798- 3.036), and increasing biopsy Gleason scores ( $p < 0.001$ , OR 1.93; CI: 1.403- 2.665) were still independent predictors of BM.

Conclusion: Men presenting with PSA values of <10ng/mL and GS≤6 should safely avoid unnecessary bone scintigraphy in initial staging of prostate cancer.

Key- words: Prostate cancer, predictors ,bone metastases

Oncology: Diagnostic and Treatment



## **P007**

Effective dose of for medical workers during Y-90 microspheres radioembolization

Authors: K Dalianis, G Kollias, F. Vlachou, T. Pipikos, R Euthimiadou, J Andreou, V Prassopoulos.

E-mail: [kdalianis@hygeia.gr](mailto:kdalianis@hygeia.gr)

Nuclear Medicine Department Hygeia Hospital, Athens, Greece

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### Introduction

Due to the increasing need for radioembolization of liver cancer with Yttrium 90 microspheres a new need for evaluation of the radiation exposure of the medical staff is necessary. The objective of this study is to assess occupational exposure for nuclear medicine, radiology and clinical staff involved in Y90 preparation and implantation. Although there are guidelines and regulation regarding the use of radioisotopes for therapy when a new technique is used for first time new measurements should be performed in order to reduce the occupational radiation doses to the workers.

### Material & Method

To estimate the effective dose from external exposure the nuclear medicine physician and the medical physicist had electronic dosimeters and TLD badges worn at the upper pocket of their overall, TLD rings on the second finger of each hand. The basic stages for radioembolization procedures involve 3 steps: measuring the Y-90 vial, segmentation of the dose, transport to radiology, implantation of the radiopharmaceutical.

### Results

The results of our study for the average cumulative whole body dose for 22 patients ( $\mu\text{Sv} \pm \text{SD}$ ) at different stages were: measuring the Y-90 vial, segmentation of the dose, transport to radiology,  $132 \pm 7,23$  (Medical

Physicist), implantation of the radiopharmaceutical  $197 \pm 6,67$  (Nuclear Medicine Physician). The mean finger exposures for the Medical Physicist were  $132 \pm 76 \mu\text{Sv/GBq}$ . For administration of resin microspheres, mean finger exposures for the Nuclear Medicine Physician were  $197.5 \pm 90 \mu\text{Sv/GBq}$ .

### Conclusion

Medical staff performing radioembolization procedures is exposed to safe levels of radiation.

The personnel dose results are significantly lower than the recommended annual dose by International Commission for Radiological Protection. However a greater effort should be made to reduce the doses further in line with the ALARA principle.

## **P008**

The contribution of 18F-FDG-PET/CT in restaging testicular cancer patients

Authors F. Vlachou, R. Efthimiadou, T. Pipikos, M. Vogiatzis, V. Filippi, A. Nikaki, D. Kechagias, K. Dalianis, S. Merisoglou, I. Andreou, V. Prassopoulos

E-mail: [kdalianis@hygeia.gr](mailto:kdalianis@hygeia.gr)

PET/CT Department, Hygeia Hospital, Athens, Greece

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**Purpose:** Although testicular cancer is a common cancer, affecting as well younger male, its prognosis remains excellent with 5 year survival rate over 90%. CT is the image of choice for staging and restaging the disease.

However, CT has the limitation of anatomical imaging and the criterion of size when evaluating residual enlarged lymph nodes. On the other hand, chemotherapy is not innocent of complications and attention should be paid when administered especially in young patients. The aim of this study is to examine the role of PET/CT in evaluating treatment response in testicular cancer patients.

**Method-Material:** 83 patients 17- 56 y.o suffering from testicular carcinoma underwent 86 PET/CT examinations for restaging their disease after treatment and evaluation of therapy response. 60 min after the IV administration of 18F-FDG, PET/CT was performed at a Siemens Biograph LSO device. PET images were reconstructed at three levels, corrected for attenuation and fused with CT. All patients had previously been restaged by conventional imaging (CT). Comparison of the two imaging modalities took place. Patients were followed up for 1 year.

**Results:** PET/CT was positive in 27/86 cases and negative in 57/86. In 23/27 cases both PET and CT were positive; however PET revealed more metastatic lesions in 4 cases, concerning lymph node invasion. In 4/27 cases CT was negative while PET showed residual disease, 1 osseous and 3 lymph node metastasis. 27/57 cases both PET and CT were negative and in 30 cases CT was either positive or equivocal (small pulmonary lesions, lymph nodes slightly enlarged) while PET was negative for hypermetabolic lesions. In 2/86 cases both PET and CT showed equivocal findings.

**Conclusion:** PET/CT is a whole body imaging modality, can be helpful in estimating treatment response and evaluating residual lesions on CT, since functional alterations precede the anatomical ones. However, attention should be paid at small pulmonary nodules that do not present hypermetabolic activity.

## P009

Evaluation of solid pulmonary nodules with dual time point 18F-FDG-PET/CT. Preliminary data

Authors: F. Vlachou, V. Filippi, A. Nikaki, M. Vogiatzis, T. Pipikos, R. Efthimiadou, K. Dalianis, V.

Papoutsis, J. Andreou, V. Prassopoulos

E-mail: [kdalianis@hygeia.gr](mailto:kdalianis@hygeia.gr)

PET/CT Department, Hygeia Hospital, Athens, Greece

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Purpose: Solid pulmonary nodules (SPN) are one of the major indications for performing PET/CT examination, with high accuracy in characterizing nodules >1cm as benign or malignant. However smaller nodules, as well as well differentiating and specific histologic types that accumulate FDG in a less degree and inflammatory processes can provoke differential diagnostic problems and lead to further unnecessary examinations. In this study we examined the possible role of delayed PET acquisition in addition to standard PET in characterizing SPN.

Method- Material: 17 patients, 7 female average 54y.o., 10 male average 66y.o. were included in the study. 8 presented with SPN  $\leq$ 1cm, 6 with SPN 1-2cm and 3 with SPN >2cm. 60min after the IV administration of 18F-FDG PET/CT was performed at a Siemens LSO Biograph PET/CT device. 60min after the first acquisition, delayed data of pulmonary fields were acquired. The size of the nodule, the uptake of the radiopharmaceutical (SUVmax) at the first and delayed acquisition were evaluated. For all patients histologic confirmation or 6 month surveillance was available.

Results: In 8 patients with SPN  $\leq$ 1cm, mean first SUVmax was 1.7 and mean delayed SUVmax 2.1. 1 nodule did not accumulate FDG at both first and delayed images and proved benign. 1 nodule presented with SUVmax 1.2 at first and 1.5 at second PET, however due to morphologic characteristics of the nodule, the patient was put under surveillance and no further therapeutic action was taken. For 6/8, the delayed SUVmax was higher than the first, with increase 1-1.38 folds and the final diagnosis was adenocarcinoma. In 6 patients with SPN 1-2cm, mean first SUVmax was 1.97 and mean delayed SUVmax 2.75. In 2 cases delayed SUVmax decreased and patients were put under surveillance, while in the rest 4 delayed SUVmax increased by 1.2-1.9 folds. Final diagnosis for these 4 patients was neuroendocrine tumor for 2 and adenocarcinoma for 2. In 3 patients with SPN >2cm, mean first SUVmax was 4.8 and mean delayed SUVmax 6.1, raise of 1.28-1.48folds and final diagnosis was adenocarcinoma. Degree of SUVmax alterations was not correlated with the grade; however this is justified considering the low tumor volume.

Conclusion: Delayed imaging can contribute to the differential diagnosis of SPN, particularly in small <1cm pulmonary nodules and in further management of the patients. Although morphologic appearance of the nodule should not be overlooked, increase of FDG uptake is correlated with malignancy, while decrease with benign condition.

## P010

Hybrid In-111-Octreotide SPECT/CT imaging in neuroendocrine tumors: contribution in image interpretation and interobserver variability

Authors: F. Vlachou, M. Vogiatzis, T. Pipikos, A. Nikaki, K. Dalianis, V. Filippi, F. Laspas, D. Papoutsani, V. Prassopoulos

E-mail: [kdalianis@hygeia.gr](mailto:kdalianis@hygeia.gr)

Nuclear Medicine Department Hygeia Hospital, Athens, Greece

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**Purpose:** The aim of this study is to assess the value of In-111-Octreotide SPECT/CT imaging in staging and restaging patients with neuroendocrine tumors and its impact in interobserver variability during interpretation of the images.

**Method-Material:** 25 patients, with neuroendocrine tumor underwent 111-Octreotide scintigraphy, for initial staging or after clinical and/or biochemical evidence of relapse. Whole body imaging was performed at 4 and 24h after the IV administration of 185MBq In-111-octreotide. Static and tomographic views of brain, thorax, abdomen and pelvis were obtained at 4, 24 and, when necessary, 48h. Images were blinded and reviewed by two experienced nuclear medicine physicians (NM). A third reader, an experienced radiologist, provided consensus in cases of disagreement of the exact location of the findings. Consensus was therefore achieved in cases of disagreement. However interobserver variability was a major question of the study and was searched. Results were scored 0-3, 0 for negative study, 1 for equivocal (surgical incision, intestinal activity), 2 for CT lesions only, 3 for lesions with increased uptake of the radiopharmaceutical.

**Results:** Final consensus SPECT/CT results: 12 patients were scored as 0 and 5 as 1. 7 patients were scored as 3: liver, brain, peritoneal implantations, supraclavicular and abdominal lymph nodes. In one case CT revealed consolidation of the upper left pulmonary lobe, however without accumulation of the radiopharmaceutical. This patient presented additionally with invaded lymph nodes (score 3). In one case, accidental finding at the breast presented at CT only (score 2) proved to be breast cancer. Final consensus planar results: 17 patients were scored as 0, 4 as 1 and 4 as 3. Agreement between NM readers was reached for liver lesions >1.5cm, liver cysts, thyroid nodules >5mm, brain lesions, surgical incisions and breast lesion. Disagreement was noticed for small liver lesions located near the gallbladder- for which the radiologist added his experience-, peritoneal implantations and abdominal lymph nodes <8mm. In total, agreement was reached for 20/25 patients (80%) when only planar images were reviewed, which increased to 23/25 (92%) with SPECT/CT.

**Conclusion:** Hybrid In-111-octreotide SPECT/CT has a promising role in identifying lesions with somatostatin receptors and in the management of patients with neuroendocrine tumors, with higher diagnostic accuracy compared to only planar imaging. Interobserver variability is minimal when SPECT/CT images are interpreted compared to only planar imaging, due to more precise tumor localization and identification of physiologic activity.

Accidental findings on CT can also be identified.

## P011

The value of hybrid In-111-Octreotide SPECT/CT imaging in neuroendocrine tumors

Authors: F. Vlachou, T. Pipikos, M. Vogiatzis, A. Nikaki, K. Dalianis, D. Papoutsani, V. Prassopoulos

E-mail: [kdalianis@hygeia.gr](mailto:kdalianis@hygeia.gr)

Nuclear Medicine Department Hygeia Hospital, Athens, Greece

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Purpose: Hybrid In-111-Octreotide SPECT/CT imaging is a promising procedure for the study of neuroendocrine tumors. While planar images can only vaguely discriminate the localization of invaded sites and physiologic uptake of the radiopharmaceutical is often mistaken for sites of disease, SPECT/CT provide fusion of functional and anatomic imaging in one device. The aim of this study is to assess the incremental value of In-111-Octreotide SPECT/CT imaging in the initial staging and restaging patients with neuroendocrine tumors.

Method-Material: From January 2011 to March 2012, 25 patients -12 male and 13 female, aged 35 to 72 y.o.- with diagnosed neuroendocrine tumor underwent 111-Octreotide scintigraphy, either for initial staging of their disease or after clinical and/or biochemical evidence of relapse. Whole body imaging was performed at 4 and 24h after the IV administration of 185MBq In-111-octreotide. Static and tomographic views of brain, thorax, abdomen and pelvis were also obtained at 4, 24 and when necessary 48h.

Images were reviewed by two experienced nuclear medicine physicians (NM).

Results were scored 0-3, 0 for negative study, 1 for equivocal (surgical incision, intestinal activity), 2 for CT lesions only, 3 for lesions with increased uptake of the radiopharmaceutical.

Results: According to SPECT/CT 7 patients were scored as 3: liver, brain, peritoneal implantations, supraclavicular and abdominal lymph nodes enriched with somatostatin receptors. In one case consolidation of the upper left pulmonary lobe did not accumulate the radiopharmaceutical (score 2); however the patient presented additionally with invaded lymph nodes (score 3). In one case a finding at the breast presented at CT only (score 2) proved to be breast cancer. 5 patients were scored as 1 and 12 as 0.

According to only planar imaging 4 patients were scored as 3, 4 as 1 and 17 as negative. The effective dose estimated for the In-111-octreotide scintigraphy is 26mSv. Additionally the patient receives 5-8mSv, depending on patient's height, from CT, when SPECT/CT is acquired.

Conclusion: Our preliminary data suggest that Hybrid In-111-octreotide SPECT/CT has a promising role in identifying lesions enriched with somatostatin receptors as well as in the management of patients suffering from neuroendocrine tumors, with adding only small amount of radiation to the patient. SPECT/CT provides more accurate tumor localization, as well as the identification of physiologic activity. Moreover accidental findings on CT should, also not overlooked.

## **P012**

### **IMPACT OF F18-FDG PET/CT IN MANAGEMENT OF mRCC - SINGLE INSTITUTION EXPERIENCE**

Authors: M. Zdraveska Kochovska1, V. Stojmenovska2, M. Angeleska1, J. Simjanovska1, G.

Petkovska2, E. Janjevik Ivanovska1

E-mail: [mzk2003@hotmail.com](mailto:mzk2003@hotmail.com)

PHI UI PET

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#### **Abstract**

Renal cell carcinoma is the most common solid tumor of the kidneys. It accounts about 3% of all malignances and representing a seventh leading cause of cancer. PET/CT has appeared as hybrid modality imaging in staging, restaging, detecting metastases and monitoring the response of therapy in most malignant diseases.

The usefulness of F18 FDG PET/CT still remains unclear and has a limited role in evaluating of RCC and it is not recommended in national guidelines as a method of choice. However in the literature there are more and more reports where F18 FDG PET/CT might be effectively used for postoperative surveillance, restaging and early assessment of recurrent/metastatic disease and affect therapeutic decisions in mRCC patients. There is report by Kayani et al. a cohort study of 44 mRCC patients treated with Sunitinib that a metabolic response by F18 FDG PET/CT at 4 weeks didn't correlate with outcomes, while metabolic progression at 16 weeks was predictive of inferior survival. Our institution has had one patient case of mRCC where F18 FDG PET/CT was performed and used in treatment planning after surgery.

Also follow up multimodality PET/CT imaging will be performed and presented in treatment monitoring after Sunitinib (Sutent; Pfizer, New York, NY) therapy, an investigational multi targeted TKI that specifically inhibits, receptors for both vascular endothelial and platelet growth factor. F18 FDG PET/CT might be helpful tool and has a great potential for the early evaluation of response to sunitinib in mRCC. Further investigation has to be performed on larger number of patients and protocol has to be standardized. It worth to recommend that in near future FDG PET/CT should be incorporate in routine standard protocols for mRCC

## P013

### PET-CT FINDINGS IN HEPATIC EPITHELOID HEMANGIOENDOTHELIOMA

Authors: 1Todorova-Stefanovski D, 2Mickoska V.3 Beshliev S., 1Tasevski S., 1Simjanovska J., 1  
Angjeleska M., 1E.Janevik-Ivanovska

E-mail: [dusicastefanovski@gmail.com](mailto:dusicastefanovski@gmail.com)

1University Institute of PET-Skopje, 2Institute for Oncology and Radiotherapy- Medical Faculty,  
Skopje, 3Faculty of medical science University Goce Delchev, - Shtip, R.of Macedonia

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Introduction: Epitheloid hemangioendothelioma is an uncommon vascular tumor of intermediate malignant potential. This tumor can affect multiple organs (lungs, liver, bones and soft tissue, skin, heart, central nervous system) but lung and liver represent two main locations. Hepatic epitheloid hemangioendothelioma, a rare sarcoma of the liver, usually appears as multiple nodules involving both hepatic lobes, and can be misdiagnosed as metastatic carcinoma on the basis of its radiologic manifestations. Case report: A 16 years old patient was presented with a cough, febrile syndrome and gastroenterocolitis. CT with contrast showed focal changes in the liver and diffuse nodular changes in both lungs. Ultrasonography examination on the abdomen shows multifocal echogenic lesions in the right lobe of the liver. An ultrasound guided biopsy was performed of a segment 4 lesion which confirmed an epitheloid hemangioendothelioma. The patient received 7 cycles of chemotherapy with Paclitaxel and Carboplatin. To assess treatment response and to guide further treatment, a whole body PET-CT scan was performed. Scan acquisition was 3 minutes per bed on a SIMENS Biograph 40 following administration of 347MBq of 18F-FDG, manufactured "in house" in our GMP facility which houses a GE PET trace Cyclotron. Pre scan glucose was 5.4 mmol/l. PET-CT showed bilateral small parenchyma lung nodules of varying size, some with calcifications but with no significant increased metabolic activity. Hypodense lesions in the liver of varying size showed low grade increased metabolic activity with SUVmax = 2.7, just above than the normal liver. (SUVmax liver=2.2). Low grade increased activity (SUV max = 1.4) was also seen in a lytic lesion at the distal left fibula measuring 1.7x 3.7cm. From the findings of the lung, liver and bone lesions, we can speculate that 18F-FDG uptake is related to the grade of malignancy. Conclusion: We present a rare PET-CT finding in a patient with hepatic epitheloid hemangioendothelioma and highlight the utility of PET CT scan as a useful imaging tool in this not very common disease. PET CT provides the capability of whole body imaging (head to toe) for anatomical and functional staging and can find additional lesions from conventional imaging as well as guide management.

Key words: epitheloid hemangio-endothelioma, PET CT, liver

## P014

PET CT total body scan - a case of respiratory image misregistration

Authors: Jovanovska B.1, Risteovski Z.1, Cvetkova S.1, Beshliev S.2 Simjanovska J.1, Zdraveska Kocovska M.1, Angeleska M.1, EJanevik-Ivanovska 1

E-mail: [brankica\\_jovanovska@yahoo.com](mailto:brankica_jovanovska@yahoo.com)

University Institute of PET, Skopje, 1, Faculty of medical science, University Goce Delchev, Shtip2, R.of Macedonia,

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Purpose: to show a case of respiratory image misregistration during performing total body PET CT scan in patient with malignant melanoma.

Material and methods: a 43 yr old female after a dissection of the tumor mass in the upper part of the lower left limb and histopathology findings in addition to metastases of malignant melanoma was sent for PET CT re-staging. PET CT scan was performed from the vertex of the skull to the feet, with the arms along the sides of the body, 3 minutes per bad on a SIMENS Biograph 40 PET-CT one hour after intravenous administration of 10 mCi (370Mbq) of 18F-fluorodeoxyglucose. 18F-FDG was manufactured in house in our GMP facility which houses a GE PET trace Cyclotron. Pre scan glucose was 5.2 mmol/l. CT scans were acquired without intravenous or gastrointestinal contrast. Results: Highly metabolically active lesions in addition to the dissemination of the primary disease were seen: in the left inguinal region (mass d ~ 16mm/ SUVmax=11.4) in the an upper part of the lower left limb medially intramuscular ( mass d ~ 4x3 cm /SUVmax = 10.1,) and in the proximal part of the left tibia (SUVmax=6.1) In the segment 4 of the left lobe of liver there was high metabolic active lesion (SUVmax=16) who do not correspond with CT for attenuation. On simultaneous display of both Computed Tomography Attenuation Corrected (CTAC) and noncorrected PET images hypermetabolic lesion in the liver correspond to hypodense lesion d=2.9x2.4 cm. However, we suggest correlation with MRI of liver due to the fact of metabolic active solitary lesion in the liver. Conclusion: The possibility of mis registrations in a PET CT total body imaging (head to toe) primarily are due to the longtime acquisition. We suggest regularly using a breath-hold acquisition technique during performing total body PET CT scan i.e using end-expiration breath-hold CT and free-breathing PET to minimize a respiratory image mis registration and lesion distortion.

However, to improves image quality and image accuracy and to avoid possible pitfalls the simultaneous display of both Computed Tomography Attenuation Corrected (CTAC) and non corrected PET images, side by side with CT images is strongly recommended.

Key words: PET CT, misregistration, artefact;



## P015

### POSITRON EMISSION TOMOGRAPHY IN A PUBLIC HEALTH SYSTEM IN REPUBLIC OF MACEDONIA - OUR EXPERIENCE

Authors: 1Angeleska M, 1Simjanovska J, 1Todorova-Stefanovski D, 1Tasevski S, 1Zdraveska-Kocovska M, 2Ganatra R, 1Janevik-Ivanovska E.

E-mail: [meriang@yahoo.com](mailto:meriang@yahoo.com)

1University Institute for positron emission tomography, Skopje, R. of Macedonia, 2University Hospitals, Leicester, UK2

**PURPOSE:** The first PET CT study in the Public Health System in the Republic of Macedonia was performed in June 2017. Our purpose is to show the experience from the very beginning with fluorine 18 fluorodeoxyglucose positron emission tomographic (PET) and computed tomographic (CT) scans routinely obtained in oncology patients and for staging and restaging of disease in patients with Hodgkin and non-Hodgkin lymphoma in a Health Public System in Republic of Macedonia. **MATERIALS AND METHODS:** We analyzed the data of all the 378 patients scanned in the first 3 months. There were 163 patients from the hematology department (mean age, 51 years) with Hodgkin disease (n =49), non-Hodgkin lymphoma (n =60) and other hematology disorders ( 54). A further 215 patients were oncology patients, (mean age, 52 years), with a variety of neoplasm: breast cancer, 80 (37.7%), lung cancer, 21 (9.9%), rectal cancer, 20 (9.4%), melanoma 18 (8.4%), colon cancer 15(7.1%), malignant neoplasm from unknown nature 13 (6.1%) and malignant neoplasm of other connective and soft tissue, 7 (3.3%). All patients underwent PET-CT scan on a BiographTM mCT-40 PET\*CT scanner 60 minutes following an injection of 370 MBq of 18F FDG (fluorodeoxyglucose).

Each dose was measured prior to the application on a Capintec dose calibrator. Whole body acquisition from the skull vertex to the upper thigh (toes for melanoma and sarcoma) was performed at 3 minutes per bed position. 18F FDG was manufactured in our GMP facility which houses a GE PET trace Cyclotron. **RESULTS:** 86 of the patients with Hodgkin disease or high-grade non-Hodgkin lymphoma did not have previous baseline PET-CT scans. Most indications (95%) for oncology patients were for re-staging with already known metastases from primary diseases. Reporting was performed jointly by an experienced nuclear medicine physician and radiologist. Some of the results were interpreted after supervision of the experts in PET-CT from International Atomic Energy Agency. The results were sent to the referring physician within three working days. Although imaging guidelines were present, in the very beginning there were many oncology patients with non-appropriate indication. Most of patients with lymphoma were sent from hematologists experienced in PET-CT. There were, however, some problem in the interpretation of these scans due to lack of baseline pre-therapy scans. **CONCLUSION:** PET-CT has been a very useful addition to the other diagnostic imaging modalities for hematology and oncology patients in the Health Public System in the Republic of Macedonia. From our first experience and initial steep learning curve we would suggest that the nuclear physicians should be involved integrally from the project planning stage and work more closely with the requesting physicians and Tumor boards or Advisory Committee. We also concluded that every PET-CT center should maintain a collaboration with other experienced nuclear medicine centers or with experts from the IAEA as a "gold standard" to minimize unforeseen problems that arise during performing or interpretation of PET CT study.

**Key words:** PET/CT, Public Health System,

## P016

### THE ROLE OF 18F-FDG PET/CT IN DETECTION OF RECURRENCE IN EPITHELIAL OVARIAN CANCER PATIENTS WITH HIGH CA-125 LEVEL

Authors: Gül Çekin\*, Incim Bezircioğlu\*\*, Seyran Yiğit\*\*\*

E-mail: [uzdrgcn@yahoo.com](mailto:uzdrgcn@yahoo.com)

Izmir Katip Celebi University, Atatürk Training and Research Hospital, Department of Nuclear Medicine\*, Department of Pathology\*\*\*Izmir, Turkey . Izmir University of Economics, Medical Faculty, Department of Obstetric and Gynecology\*\*, Izmir, Turkey.

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#### PURPOSE:

The purpose of our retrospective study was to investigate the efficacy of 18F-FDG PET/CT in the detection of residual/recurrent tissue in the follow-up of patients with ovarian cancer whose serum Ca-125 level is rising.

#### MATERYAL and METHODS:

24 patients with histologically proven ovarian cancer were included in the study. All patients completed their treatment which included surgery and/or adjuvant chemotherapy. The study group consisted of follow-up patients who underwent 18F-FDG PET/CT imaging either after abnormal Ca-125 levels.

Total 27 18F-FDG PET/CT imaging were performed in 24 patients. The mean age of the patients was  $58.3 \pm 10.3$ . The tumor histopathology was derived from epithelial origin in all. 18F-FDG PET/CT imaging results were compared with histopathological diagnosis after biopsy or surgical procedures following imaging.

#### RESULTS:

Residual/recurrent disease was diagnosed histopathologically in 26 of 27 PET/CT scans. PET/CT showed positive finding in all residual/recurrence disease . The most common metastasis places in PET/CT imaging were the lymph nodes. The involvement areas were abdominal-pelvic lymph nodes in 20 (74.1%), thoracic lymph nodes in 4 (14.8%), cervical lymph node in 2 (7.4%), peritoneal involvement in 17 (62.9%), and primary tumor areas in 8 (29.6%) PET/CT imaging. When evaluated according to histopathological diagnosis, 26 true positive and 1 true negative results were obtained in PET/CT. Sensitivity, specificity and accuracy rate for PET/CT were 100%, 100%, 100% respectively for the detection of residual/recurrent tissue in the patients with ovarian cancer.

#### CONCLUSION:

18F-FDG PET/CT imaging, which helps the clinicians in diagnosis and treatment planning is a valuable tool in detection of residual/recurrent disease in the follow-up of patients with ovarian cancer whose serum Ca-125 level is rising.

## P017

Vitamin D deficiency and calcium in osteoporotic patients

Authors: Rubina Alimanovic-Alagic<sup>1</sup>, Sekib Sokolovic<sup>2</sup>, Emina Ferhatbegovic-Opankovic<sup>1</sup>.

E-mail: [rubinaalimanovic@yahoo.com](mailto:rubinaalimanovic@yahoo.com)

<sup>1</sup>University of Sarajevo Clinical Center, Clinic for nuclear medicine and endocrinology, Sarajevo, Bosnia and Herzegovina,

<sup>2</sup> University of Sarajevo Clinical Center, Clinical for heart and rheumatism, Sarajevo, Bosnia and Herzegovina

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Introduction: Osteoporosis is a serious, life-threatening disease in both men and women increases with age. This disease is characterized by bone fractures, especially of the spine and hip, although any bone can be affected. Calcium is an essential element in the human body and is necessary to many cell functions. Adequate intake of calcium is necessary to maintain this balance. Vitamin D deficiency is a global health problem and leads to serious problems, can result in low bone mass. The effects of vitamin D independent of calcium, magnesium, and phosphate.

The aim of this study is to characterize the prevalence of vitamin D deficiency and calcium in osteoporotic patients.

### Material and Methods

As a part of the investigational project 988 participants were examined of the University Clinical Center of Sarajevo, age 20 to 80 during 6 months. For each patient we did personal history, age, DXA, BMI, medications, family history and life style. We have confirmed the presence of osteoporosis with a DXA greater than -2.5 SD, the results of vitamin D and calcium levels. Serum 25(OH) vitamin D and serum Calcium were measured using Rosche Elecsys system on Cobas e 601 analyzers at Clinic for Nuclear medicine and Endocrinology and Clinical Chemistry and Biochemistry. Referral values for using this method are D vitamin 30,0-50,0 ng/mL and Calcium 2,10-2,55 mg/L. Osteoporosis was diagnosed based on the bone mineral density (BMD) T-score values  $\leq -2.5$  at the lumbar spine and/or proximal femur measured with dual-energy xray absorptiometry (DEXA).

### Results

In investigated group of 988 patients. The frequency of occurrence of osteoporosis is most common 44% between the ages of 40-59 years. The patients have a vitamin D deficiency 76% and low-normal calcium levels 69 %. We have found the existence of osteoporosis in 73% of the female population, compared to men whose osteoporosis occurred only in 27% of cases. Results of vitamin D were very low at the beginning of the test and stood at about 14.1 ng/mL, after six months of therapy of 800-2000 IU per day amounted to around 42,1 ng/mL. Also the results of calcium were low to 6 months of therapy 500-1000 mg daily improvements.

### Conclusion(s)

Calcium and vitamin D alone have the ability to prevent bone loss and reduce fracture. Vitamin D deficiency is associated with low bone mineral density in patients who have diagnosed osteoporosis. The effects of vitamin D independent of calcium, magnesium, phosphate and nutrition and have an impact on the incidence of osteoporosis. The prevalence of hypovitaminosis D has public health implications, and requires adequate access to the therapy of vitamin D supplements, calcium and other minerals.

Key words : osteoporosis, vitamin D deficiency

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## P018

### SUBACUTE (DE QUERVAIN'S) THYROIDITIS (SAT) – WHAT DID WE LEARN FROM 40 YEARS FOLLOW-UP?

Authors: Topuzović N, Topuzović S, Jurić A1, Kordić Brandić M, Delalić H, Mihaljević I.

E-mail: [xtopuz@gmx.net](mailto:xtopuz@gmx.net)

Clinical Institute of Nuclear Medicine and Radiation Protection, University Hospital Osijek, Faculty of Medicine Osijek, J.J. Strossmayer University of Osijek, Croatia

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Aim: SBT is an acute well-know condition that causes pain and discomfort in the thyroid and neck. However, the degree to which the differences between approaches may be clinically relevant has varied across the clinical studies on the topic, and so we wished to further characterize it in a population of patients with SAT who have been followed for 40 years.

Material and Methods: We retrospectively reviewed the records of patients with SAT seen at our institution since 1978. In total, 416 patient (13% men, 87% woman, age range 28-75 years) with citologically proven SAT and negative thyroid peroxidase antibody were enrolled in the study. Thyroid morphology and function were analized at various times by hormon testing, Tc-99m scintigraphy and ultrasonography (US).

Results - lessons we can learn from the long-term evaluation of SAT:

1. The thyroid can be severely damaged or even destroyed at the same time leaving patients seriously ill which present significant challenges to physicians treating them.
2. However, patience for patients and physicians is welcome during the SAT. Even when things seemed to be at their worst the final prognosis is excellent.
3. Getting out of debt is important: the treatment of choice to relieve acute symptoms are nonsteroidal anti-inflammatory drugs. The treatment with corticosteroids extend duration of healing period and increase the recurrent rate of SAT.
4. Triphasic clinical course of transient hyperthyroidism and hypothyroidism, and return to normal thyroid function is associated with all patients.
5. At the beginning US demonstrated diffuse decreased echogenicity with no nodular lesion in 16%, diffuse decreased echogenicity with nodular lesion in 34%, and normal echogenicity with nodular lesion in 50% of patients.
6. Long-term follow-up showed complete restoration of thyroid in all patients.

Conclusion: SAT passes without lasting consequences on thyroid morfology and function.

## **P019**

### **CHALLENGES IN ESTABLISHMENT OF CYCLOTRON AND PET/CT UNIT IN THE REPUBLIC OF MACEDONIA**

Authors: Marina Zdraveska Kochovska, Meri Angeleska, Maja Velichkovska, Emilija Janevik Ivanovska

E-mail: [mzk2003@hotmail.com](mailto:mzk2003@hotmail.com)

PHI UI PET , Skopje, Macedonia

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In 2015 y officially was marked the beginning of the new era for medical world in the Republic of Macedonia. The cyclotron unit became operational and enabled the installation and operation of the first public PET/CT scanner. It was the biggest advanced technology investment that has ever happened in the field of medical imaging, installation of the cyclotron unit and diagnostic unit with hybrid imaging system PET/CT. The investment was done by the government of the Republic of Macedonia and the project was realized with the tremendous support of experts from the International Atomic Energy Agency (IAEA). By installing the first cyclotron in the region the production of short lived radioisotopes become reality. The new developed institution is recognized as Public health institution, University institution and fully covers the own needs, also have a capacity to cover two private PET/CT units in the Republic of Macedonia and wider Balkan area. Establishing a PET/CT and a cyclotron unit together in one building is a very complicated project. It takes a lot of time and needs enormous effort dedication, excellent planning with expert advice from highly qualified personnel. Nowadays the results of this hard work are visible and available to the citizens of the Republic of Macedonia as well as neighboring countries. In the paper will be present the results of daily routine quality control of the cyclotron and installed sophisticated equipment in radio pharmacy laboratory. Also, diagnostic part is equipped with hybrid system such as PET/CT Siemens mCT which combine the powerful PET technology with the highly precise X-ray imaging. We are proud that this "state of art" technology we made closer to our citizens and we really hope that they will feel the benefit of this new technology in early diagnosing but also to avoid unnecessary and costly therapies. Also, a positive impact on the overall healthcare budget is also expected.

## **P020**

### **THYROID MALT LYMPHOMA - CASE REPORT**

Authors: Pavković I.; Rajkovača Z.; Stanimirović D.; Jelić D.; Veriš-Smiljić T.;

E-mail: [ivanapavkovicbanjaluka@gmail.com](mailto:ivanapavkovicbanjaluka@gmail.com)

University Clinical Centre of the Republic of Srpska-Institute of Nuclear Medicine and Thyroid gland Disease-Banja Luka, BiH

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Thyroid gland lymphoma makes 1-5% of all malignant thyroid tumors, whereas

Malt lymphoma occurs in about 2-7% of all cases of extranodal lymphoma.

Chronic lymphocytic thyroiditis is a predisposition for the development of primary lymphoma of the thyroid gland.

In the period from 2006 to 2017, a total of 1.909 lobectomy and thyroidectomy has been performed at the University Clinical Center of the Republic of Srpska.

Of the 1.909 patients, only one female patient had a pathologic diagnosis of Malt lymphoma and chronic lymphocytic thyroiditis.

We present a case of a female patient with chronic lymphocytic thyroiditis and Malt lymphoma, presented by enlargement of the thyroid gland during past year, the dominant left lobe with breathing difficulty.

Preoperatively, a complete diagnostic treatment of the patient within struma of the thyroid gland was done without a doubt on tumor changes.

Since the diagnosis of Malt lymphoma in situ was patohistologically diagnosed, the remaining diagnostic procedures were made postoperatively to determine the stage of the disease, within 18F-FDG PET/CT was performed too.

This case report shows extremely rare detection of lymphoma in the thyroid gland, but certainly a great caution too about the possibility of lymphoma formation in the area of chronic lymphocytic thyroiditis.

Key words: Malt lymphoma, thyroid gland, 18F-FDG PET/CT.

**P021**

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Author: Ahmad Tawfiq Alenezi

E-mail: [abo-torab@hotmail.com](mailto:abo-torab@hotmail.com)

Kuwait University, Kuwait

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Alzheimer's disease (AD) is a neurodegenerative disorder, which considered the most common aetiology of dementia. There are very limited therapeutic applications for AD due to the lack of comprehensive understanding of this disease. Several biomarkers for AD have been highlighted; however, most of them are common with others neurological disorders. Beta-amyloid plaques ( $\beta A$ ) & neurofibrillary tangles are the classical biological hallmarks in AD. In fact, the conventional diagnostic methods in detecting these changes are risky, challenging and not considered a direct indicator of AD. Positron emission tomography imaging, using diverse radiotracers, may provide more sensitive and safer way for detecting various functional and molecular changes in AD.



## **P022**

### **CONTRIBUTION OF FDG PET IMAGING IN THE DETECTION OF UNDERLYING CARCINOMA IN A WOMAN WITH NONSPECIFIC MASTITIS**

Authors: Oguz Hancerliogullari<sup>1</sup>, Semra Ince<sup>2</sup>, Rahman Senocak<sup>1</sup>, Nuri Arslan<sup>2</sup>.

E-mail: [drsemra@gmail.com](mailto:drsemra@gmail.com)

<sup>1</sup>University of Health Sciences, Gulhane Training and Research Hospital, Department of General Surgery, Etlik, Ankara, TURKEY <sup>2</sup>University of Health Sciences, Gulhane Training and Research Hospital, Department of Nuclear Medicine, Etlik, Ankara, TURKEY

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**Introduction.** Differentiation between a malignancy and inflammatory process is still a diagnostic challenge. Mammography (MG) and ultrasonography (US) have low sensitivity and specificity in dense breasts in order to detect malignancy. On the other hand, malignant mass lesions can also be masked on magnetic resonance imaging (MRI) by diffuse inflammatory process.

18-fluorodeoxyglucose positron emission tomography (FDG PET) imaging can be a promising alternative imaging method in the evaluation of suspicious breast masses, especially in patients with accompanying inflammatory breast diseases.

**Case report.** We report an atypical case of a patient suspected for malignancy in right breast on physical examination and radiologic findings in favor of mastitis. Neither MG nor US revealed any mass lesion consistent with malignancy. Moreover, MRI findings were primarily considered as infectious or granulomatous mastitis. However, FDG PET determined the accurate borders of tumor and dissemination of breast cancer with superiority to other conventional radiological methods.

**Conclusion.** This case report emphasizes the contribution of FDG PET imaging to other conventional radiological methods with regard to primary tumor diagnosis, determination of the biopsy site, and also staging the disease especially in patients with accompanying inflammatory breast disease.

## P023

### CLINICAL SIGNIFICANCE OF [18 F]FDG UPTAKE ON PET/CT IMAGING IN TERMS OF RECURRENCE OR RESIDUAL DISEASE IN PATIENTS WITH COLORECTAL CANCER

Authors: Semra Ince<sup>1</sup>, Kursat Okuyucu<sup>1</sup>, Oguz Hancerliogullari<sup>2</sup>, Engin Alagoz<sup>1</sup>, Huseyin San<sup>1</sup>, Nuri Arslan<sup>1</sup>

E-mail: [drsemra@gmail.com](mailto:drsemra@gmail.com)

<sup>1</sup>University of Health Sciences, Gulhane Training and Research Hospital, Department of Nuclear Medicine, Etlik, Ankara, TURKEY <sup>2</sup>University of Health Sciences, Gulhane Training and Research Hospital, Department of General Surgery, Etlik, Ankara, TURKEY

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**Aim:** The aim of this study was to evaluate clinical significance of 18 F-fluorodeoxyglucose ([18 F]FDG) uptake on positron emission tomography/computed tomography (PET/CT) imaging in detecting recurrence or residual disease in patients with colorectal carcinoma (CRC).

**Methods:** We evaluated 53 lesions in 46 consecutive patients (20 men, 26 women; mean age of  $58.6 \pm 10.90$ ; age range: 30–89 years) with FDG PET/CT.

All patients had previous surgery. The main indications for the PET/CT orders were suspicions of recurrence (indicated by elevated of CA 19-9 levels (10 cases, %19) or conventional imaging tests (17 cases, 32%)) or residual disease (26 cases, %49). The most common site of FDG uptake was rectosigmoid (41.5%). All [18 F]FDG uptakes were confirmed by histopathologic or colonoscopic findings.

**Results:** The sensitivity, specificity, positive predictive value, and negative predictive value of FDG PET/CT in the detection of recurrences or residual disease were 100%, 51.7%, 63.1%, and 100%, respectively. In 48.1% of the cases with normal CA 19-9, FDG PET/CT was true positive and in 10% of the cases with elevated CA 19-9, FDG PET/CT was true negative. In follow up, conventional imaging tests (CT/MRI/US) detected suspicious malignancy in 32% (17/53) of the cases and further examination with FDG PET/CT was true negative in 35.2% (6/17).

**Conclusion:** [18 F]FDG uptake on PET/CT imaging is highly sensitive for both benign and malign lesions in patients with CRC. However, FDG PET/CT appears to have great impact especially in revealing true negativity of lesions suspected for recurrence or residual disease and thus may prevent unnecessary treatments.

## **P024**

### **THE ROLE OF THE HYBRID IMAGING TECHNIQUES SPECT-CT AND PET-CT IN THE THERAPY ALGORITHM OF PATIENTS WITH SOMATOSTATIN EXPRESSING TUMORS**

Authors: Kostadinova I., Demirev An., Mateva G.

E-mail: [irdika1@abv.bg](mailto:irdika1@abv.bg)

Adcibadem city clinic oncology, Sofia, Bulgaria

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Somatostatin receptor scintigraphy is known to be highly sensitive for the diagnosis of somatostatin expressing neuroendocrine tumors, their regional and distant metastasis. The aim of our study was to share our experience in the application of the hybrid imaging techniques SPECT-CT and PET-CT in therapy monitoring and their role for the choice of the applied therapy in patients with SR-expressing tumors. In total 121 examinations were performed on 45 patients before and after 3-6 cycles of therapy (31 of them were examined triple), using the somatostatin analog 99mTc-HYNIC-TOC (Tektrotyd, PL) at activity between 370-550 MBq. The average level of chromogranin was 221 ng/ml and that of Ki 67-19%. Whole body and SPECT-CT scintigraphy were performed 2-4 h p.i. In 28/45 of the patients, in whom Ki 67 was above 2%, 18F-FDG PET-CT was additionally applied within two weeks.

At initial presentation, the SR scintigraphy with SPECT-CT was only positive in 31/45 of the patients, the scintigraphy with PET-CT was only positive in 6/45 of the patients and in 8/45 the result was positive in both techniques. All patients with positive results were referred for surgery or somatostatin therapy and/or chemotherapy depending on the stage and the differentiation of the disease. At the follow up, in 10/45 Pts there was a progression of the disease, in 29-stable disease and in 6-regression. As a result of the exams, the therapy was modified or change in 62% / 28/45 of the patients /. In summary, we suggest that the use of SPECT-CT and PET-CT can help to reliably choose the individual therapy of the patient with somatostatin expressing tumors and to follow its effect.

## P025

### DEVELOPMENT OF THE METHOD FOR BIO-ANALYSIS OF <sup>68</sup>Ga-PSMA-11 IN PATIENT BLOOD

Author: Aljoša Stanković

E-mail: [aljoša.stankovic@gmail.com](mailto:aljoša.stankovic@gmail.com)

University clinical centre of the Republic of Srpska/Banja Luka/Bosnia and Herzegovina

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#### Purpose

The aim of the study was to optimize the Solid Phase Extraction (SPE) combined with UPLC method for bio-analysis of [<sup>68</sup>Ga]-PSMA-11 in patient blood and to make validated protocol. The developed method would be used for construction of pharmacokinetic model of [<sup>68</sup>Ga]-Ga-PSMA-11 and its formed metabolites in blood.

#### Material and Methods

For development of SPE and UPLC method plasma from 4 different patients was collected. Trapping efficiency was tested between Sep-Pak and Waters OASIS cartridge. Optimization of the elution step with different pH of the sample, different solutions and pH of the solutions was performed. For development of UPLC method, C18 and 5µm columns with different length were tested. The solvents (water + 0.1% TFA and acetonitrile + 0.1%TFA) in gradient UPLC method were optimized. Elution fractions were collected with fraction collector (0.5 min) and measured in the well counter. Both recoveries of SPE and UPLC were calculated.

#### Results

Waters OASIS 6cc cartridge showed the best performance for efficient trapping of [<sup>68</sup>Ga]-PSMA-11. Acidification of 70% ethanol with 200 µl 1M HCl improves elution step and acidification of the sample helps to minimize the activity in wash and waste step. The best results were obtained with

C18 4.6x250mm 5µm column. The highest activity of elution fractions were measured at the retention time of 7.5–8.0 min. Recoveries from SPE and UPLC were 94.44% and 112.61% respectively.

#### Conclusions

The optimized SPE and UPLC methods proved to be good method to separate and identify the compound [<sup>68</sup>Ga]-PSMA-11 from the complex blood matrix. With the retention time of 7-8 min, which is in accordance with cold Ga-PSMA-11/PSMA-11, [<sup>68</sup>Ga]-PSMA-11 could be identified. These results are promising for further analysis of [<sup>68</sup>Ga]-PSMA-11 in patient blood, taken in definite time points after injection.

Key words: [<sup>68</sup>Ga]-PSMA-11, Solid Phase Extraction, UPLC

## P026

### SOLITARY FIBROUS TUMOR OF MEDIASTINUM AND F-18 FDG PET/CT: A CASE REPORT

Authors: Cekin Gül\*, Ersöz Hasan\*\*, Cakır Izzetiye Ebru\*\*\*

E-mail: [uzdrgcn@yahoo.com](mailto:uzdrgcn@yahoo.com)

Izmir Katip Celebi University, Atatürk Training and Research Hospital, Depts. of Nuclear Medicine\*, Thoracic Surgery\*\* and Pathology\*\*\*, Izmir-Turkey.

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#### PURPOSE:

To evaluate the efficacy of F-18 FDG PET/CT in solitary fibrous adenoma.

#### CASE:

A 64-years old woman was admitted to the hospital for shortness of breath, fever and cough. On chest examination, breath sounds were absent on the right hemithorax. The plain chest X-ray showed the presence of a giant mass in the right hemithorax. Contrast-enhanced Computed Tomography scan showed a large mass in right hemithorax. Then F-18 FDG PET/CT was performed and the well-demarcated lesion pushing mediastinum to the left in the covering right hemithorax was appeared heterogenous increased metabolic activity (SUVmax=6.1). The patient underwent a thoracotomy and it was successfully resected totally. The pathological diagnosis of the tumor was localized fibrous tumor of the mediastinum.

#### DISCUSSION:

Solitary fibrous tumor of mediastinum is a rare neoplasm. In the literature; although both benign and malignant solitary fibrous tumors with low FDG uptake have been reported, there are also malignant cases with high

F-18 FDG uptake. In this study, PET/CT images showed high uptake in the tumor and histopathological findings are showed that three malignant criteria: massive tumor measuring, greater cellularity, necrosis.

#### CONCLUSION:

F-18 FDG PET/CT may provide an information on the solitary fibrous tumor by giving both functional and morphological imaging data in the pre-operative period .

Keywords: F-18 FDG, PET/CT, solitary fibrous tumor, mediastinum.

## P027

### USE OF PARKINSON'S DISEASE RELATED PATTERN IN A PATIENT WITH ATYPICAL CLINICAL PRESENTATION OF PARKINSON'S DISEASE

Authors: \*Grmek M, \*\*Rus T, \*Tomše P, \*Jensterle L, \*\*Trošt M

E-mail: marko.grmak@kclj.si

\*Department of Nuclear Medicine, University Medical Center Ljubljana, Slovenia; \*\*Department of Neurology, University Medical Center Ljubljana, Slovenia

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Introduction: Regional changes of brain metabolism measured with 18F-FDG PET/CT (FDG/PET) can help in differentiation of neurodegenerative parkinsonian syndromes. Based on network analysis FDG/PET brain studies performed in patients with different neurodegenerative parkinsonisms using specific network analysis called scaled subprofile model/principal component analysis (SSM/PCA), different metabolic brain patterns specific for each parkinsonian syndrome were identified - among them Parkinson disease related pattern (PDRP), multiple systemic atrophy related pattern (MSARP) and progressive supranuclear palsy related pattern (PSPRP).

Expression of these patterns can be calculated prospectively for any FDG/PET brain study using Topographic Profile Rating (TPR) analysis.

Aim: To present a patient with parkinsonism with atypical clinical presentation and the contribution of FDG/PET brain studies in clinical diagnostics.

Patient and methods: In 52 years old parkinsonian male patient with atypical clinical presentation in whom the possible multiple system atrophy was diagnosed, FDG/PET brain imaging was performed. Visual reading and Statistical Parametric Mapping analysis were consistent with idiopathic Parkinson's disease (PD), mostly due to hyperactive basal ganglia. Since atypical parkinsonian syndrome was suspected we used TPR analysis to calculate the expression of PDRP, MSARP and PSPRP.

Results: PDRP expression was high and MSARP and PSPRP were low compare to normal. Furthermore, we used previously developed logistic algorithm to calculate probability of specific disease; probability for Parkinson's disease was over 93% compared to atypical parkinsonian syndromes with probability of less than 7%.

Six years after the disease onset and few months after FDG/PET brain study patient died due to cardiorespiratory arrest. Post-mortem pathohistological examination was consistent with the idiopathic Parkinson's disease.

Conclusion: Functional brain imaging with FDG/PET may be helpful in diagnosing and differentiating among parkinsonian syndromes. Implementation of PDRP as well as other disease specific brain network patterns into clinical practice may significantly improve the accuracy of the early diagnosis of parkinsonian syndromes.

## P028

Role of FDG-PET/CT in Primary Central Nervous System Lymphomas: Contribution to Patient Management as a Prognosticator

Autori: Semra Ince,MD1, Kursat Okuyucu,MD1, Engin Alagoz,MD1, Sukru Ozaydin,MD2, Nuri Arslan,MD1 1 Nuclear Medicine Department, Gulhane Training and Research Hospital, Ankara, Turkey 2 Medical Oncology Department, Gulhane Training and Research Hospital, Ankara, Turkey  
E-mail: [drsemra@gmail.com](mailto:drsemra@gmail.com)  
Ankara

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Objective: Primary central nervous system (CNS) lymphoma is an aggressive and fatal extranodal non-Hodgkin lymphoma (NHL) confined to CNS at initial diagnosis. It has a poor prognosis and fatal outcome according to systemic NHL. Until now, a lot of baseline risk factors like serum lactate dehydrogenase (LDH) level, age, Karnofsky performance score (KPS), involvement of deep brain structures (DBS), cerebrospinal fluid protein concentration and many scoring systems consisting of them have been stated to estimate the prognosis. FDG-PET/CT has a high prognostic value with respect to overall survival (OS) and disease-free survival (DFS) in many cancers and lymphomas. We studied to evaluate the role of metabolic tumor parameters derived from primary staging FDG-PET/CT for prognosis estimation in primary CNS lymphoma.

Material and Methods: 12 patients having primary CNS lymphoma of diffuse large B-cell type (stage I disease) were included in this retrospective cohort study. Primary staging FDG-PET/CT were performed and quantitative parameters of maximum standardized uptake value (SUVmax), average standardized uptake value (SUVmean), metabolic tumor volume (MTV) and total lesion glycolysis (TLG) were calculated for all patients before the treatment. Cox regression analysis was used to examine the related factors with survival time.

Results: There were 5 male and 7 female patients. Mean age of the patients was 56 years. Mean OS and DFS were 21 and 13 months, respectively. Mean SUVmax, SUVmean, MTV and TLG were  $19.2\pm4.5$ ,  $10\pm3.2$ ,  $48\pm15$  cm<sup>3</sup> and  $510\pm170$ , respectively. After the analysis of all potential risk factors effecting recurrence/metastasis (age, sex, serum LDH, involvement of DBS, SUVmax, SUVmean, MTV, TLG) with univariate analysis; TLG remained statistically significant ( $p=0.03$ ).

Conclusion: Although all metabolic tumor parameters are helpful in prognosis estimation of primary CNS lymphomas, TLG is the most important one of them and may play a role in patient management.

## P029

High metabolic tumor volume and total lesion glycolysis derived from baseline 18FFDG PET/CT may predict the metabolic abnormalities in newly diagnosed cancer patients

Authors: Aysun ÇETİN1 , Ümmühan ABDULREZZAK2 , Semih YILMAZ1 , Gökmen ZARARSIZ3 Soner AKKURT4 , Mahmut UÇAR5 , Leylagül KAYNAR5 , Esra YILDIZHAN5 , Esra Ermiş TURAK5 , Ersin ÖZASLAN5 , Kürşat GÜNDOĞAN6 , Mevlüde İNANÇ5 , Mustafa KULA2 , Mustafa ÇETİN5 1  
E-mail: [ummuhanfg@gmail.com](mailto:ummuhanfg@gmail.com)

1Department of Medical Biochemistry/Faculty of Medicine, Erciyes University, Kayseri-Turkey

2Department of Nuclear Medicine/Faculty of Medicine, Erciyes University, Kayseri-Turkey

3Department of Biostatistics/Faculty of Medicine, Erciyes University, Kayseri-Turkey

4Department of Sports Medicine/Faculty of Medicine, Erciyes University, Kayseri-Turkey

5Department of Hematology-Oncology /Faculty of Medicine, Erciyes University, Kayseri-Turkey

6Department of Internal Medicine/Faculty of Medicine, Erciyes University, Kayseri-Turkey

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The present study was conducted to investigate the role of total body metabolic tumor volume (MTV, mm<sup>3</sup>) and total lesion glycolysis (TLG) values obtained by PET/CT imaging for predicting metabolic abnormalities in newly diagnosed cancer patients. Patients having solid tumors with initial PET/CT staging were evaluated in a prospective cohort study. MTV and TLG values of all patients were measured beside SUV values as PET/CT parameters. Initial metabolic status of patients was evaluated based on basal metabolic rates, serum vitamin, mineral, and biochemical metabolite levels and antioxidant enzyme capacities. The MTV and TLG levels revealed significant relationships with cancer-induced metabolic abnormalities as high BMR and LDH, and low albumin levels as well as advanced stage and presence of metastasis ( $p < 0.05$ ). Cut-off values and sensitivity and specificity rates in terms of high BMR ( $> 20$  Kcal/kg) were obtained to be  $> 52400$  mm<sup>3</sup> for MTV (0.84 and 0.63) and  $> 274208$  for TLG (0.84 and 0.63). The same values for high LDH were  $\geq 219520$  mm<sup>3</sup> (0.52 and 0.88) for MTV and  $\geq 411792$  (0.78 and 0.58) for TLG, respectively. The values for low albumin levels were  $\leq 89520$  mm<sup>3</sup> (0.63 and 0.10) for MTV, and  $\leq 887840$  (0.75 and 1.00) for TLG, respectively. In conclusion, MTV and TLG cut-off values determined by ROC analysis can predict metabolic abnormalities in initial BMR, LDH and albumin levels with high specificity and sensitivity. It was recommended to test MTV and TLG levels to determine initial metabolic status of diverse clinically significant patient groups with various cancer types.  
Keywords: MTV, TLG, BMR, Metabolic abnormality, Cancer



## P030

Technetium-99m-dimercaptosuccinic acid renal scintigraphy in children with congenital hydronephrosis

Authors: Boris Ajdinović<sup>1,2</sup> MD, PhD Biljana Bazić-Đorović<sup>1</sup> MD, Marija Radulović<sup>1</sup> MD, MSc Marija Šišić<sup>1</sup> MD, MSc Sanja Dugonjić<sup>1</sup> MD, PhD, Slobodanka Beatović<sup>3</sup> MD, PhD, Milica Janković<sup>4</sup> PhD, Zoran Krstić<sup>5</sup> MD, PhD,

E-mail: [ajdinovicboris@gmail.com](mailto:ajdinovicboris@gmail.com)

1. Institute of Nuclear Medicine, Military Medical Academy, 2. Faculty of Medicine of the Military Medical Academy, University of Defense, and 3. Institute of Nuclear Medicine, Faculty of Medicine, Belgrade University and 4. Faculty of Electrical Engineering, Belgrade University, and 5. University Children's Clinic, Belgrade University, Belgrade, Serbia

Objective. The purpose of this study was to evaluate damage of the kidney with technetium-99m-dimercaptosuccinic acid (99mTc-DMSA) scintigraphy in children with congenital hydronephrosis (CH) and the influence of other postnatal associated diagnoses on abnormal 99mTc-DMSA findings. Subjects and Methods. 99mTc-DMSA scintigraphy in 54 children (17 girls and 37 boys), aged from 2 months to 5 years (median 11 months) with 66 congenital hydronephrotic renal units (RU) (42 unilateral hydronephrosis-29 boys and 13 girls; 12 bilateral hydronephrosis-8 boys and 4 girls) was performed. Male/female ratio was 2,2: 1, unilateral/bilateral hydronephrosis ratio was 4:1. Hydronephrosis classified into three groups according to ultrasound measurement of the antero-posterior pelvic diameter APD: mild (APD 5-9.9mm) was present in 13/66RU, moderate (APD 10-14.9mm) in 25/66RU, and severe (APD  $\geq 15$ mm) in 28/66RU. Simple hydronephrosis was present in 15RU, and the postnatal associated clinical diagnosis were vesicoureteric reflux (VUR) in 21, pelviureteric junction (PUJ) obstruction in 7, pyelon et ureter duplex in 11, megaureter in 11 and posterior urethra valves in 1RU, respectively. Static renal scintigraphy was performed 2 to 3 hours after intravenous (iv) injection of 99mTc-DMSA using a dose of 50 $\mu$ Ci/kg (1.85MBq/kg; minimal dose: 300 $\mu$ Ci). Four views (posterior, left and right posterior oblique and anterior) were obtained with a head gamma camera "Orbiter" filtered with high resolution parallel whole collimator. All images were stored in an Pegasys computer with a matrix size of 256x256. The relative kidney uptake (RKU) between the left and right kidney was calculated as an average number counts from anterior and posterior view. Renal pathology was defined as inhomogenous or focal/multifocal uptake defects of radiopharmaceutical in hydronephrotic kidney or as split renal uptake of <40%, and poor kidney function was defined as split renal uptake <10%. Descriptive and analytical statistics (SPSS version 20.0) was performed. Analytical statistics implied the non-parametric Mann-Whitney test for determination of statistically significant difference between the normal and pathological findings on 99mTc-DMS scan. The default level of significance was P<0.05. Results: Our 99mTc-DMSA scintigraphy findings in children with ANH were: decreased or enlarged kidney with inhomogeneous kidney uptake radiopharmaceutical in 22, irregular shape kidney with inhomogeneous accumulation of radiopharmaceutical in 3, connected (fused) kidney in 1 patient, and poorly or nonvisual kidney in 14RU respectively (total 40/66RU with pathological 99mTc-DMSA finding, 60,6%). Relative accumulation in hydronephrotic kidney was less or equal to 40% in 17RU, less than 10% in 14RU and inhomogeneous radiopharmaceutical uptake with relative accumulation over 40% was detected in 9RU. Regular kidney morphology with homogeneous accumulation of radiopharmaceutical (normal DMSA scintigraphy finding) were found in 26/66RU (39,4%). Statistically significant correlation between the degree of the hydronephrosis (APD) and 99mTc-DMSA scan findings (P<0.001) and between the degree of the VUR and DMSA scan finding (P=0.002) was established. In our study, other associated diagnosis

were not statistically correlated with pathological findings on  $^{99m}\text{Tc}$ -DMSA scan due to low number of patients. Conclusion: On the basis of these results (60% pathological findings) we recommend DMSA scintigraphy in the evaluation renal pathology in children with congenital hydronephrosis. Greater number of patients is needed for the estimation of the associated diagnosis (other than VUR) influence on the renal parenchymal damage in children with CH.

### **P031**

Comparison of SUV max values obtained from 18F-FDG PET/CT and cell-free DNA levels measured from plasma in oncology patients

Authors: Fatmanur Celik1, Yusuf Z.Tan1, Semra Ozdemir1 and Fatma Silan2

E-mail: [yziyatan@yahoo.com](mailto:yziyatan@yahoo.com)

1. Department of Nuclear Medicine, School of Medicine, Canakkale Onsekiz Mart University, Canakkale, Turkey 2. Department of Medical Genetic, School of Medicine, Canakkale Onsekiz Mart University, Canakkale, Turkey Correspondence author;

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**Objective** Cancer is an important health problem. Early detection of cancer has great importance in preventing mortality and morbidity linked to cancer. The aim of this study is to compare the quantitative value of SUVmax obtained from F-18 FDG PET/CT imaging of oncology patients with the cell free DNA (cfDNA) amounts measured in plasma of patients and thus research whether cfDNA is a significant marker to identify the presence of malignancy in the early period.

**Materials and methods** The study was prospective and began after receiving ethics committee permission from our center. The clinical situation, histopathologic, laboratory and treatment parameters were investigated from patient files. SUV max and cfDNA quantities were assessed using the Mann–Whitney U-test and clinical characteristic analysis.

**Results** A total of 184 patients (87% female, 47.3% male, 97% male) were included in the study group, ranging in age from 25 to 89 years with a mean age of  $53.38 \pm 17.98$  years. There was no statistically significant difference in plasma cfDNA values between patient and control group. As a result of the comparison of SUVmax and cfDNA values in the study, there was a weak correlation between SUV max and cfDNA ( $r = 0,140$ ;  $p = 0,059$ ).

**Conclusion** In researching the response of cancer to early diagnosis and treatment, no diagnostic method is sufficient alone. There is a need for comparison of cfDNA levels obtained from plasma and quantitative parameters from PET/CT images of oncology patients in more detailed advanced studies with larger patient series.

## **P032**

### **SENTINEL LYMPH NODE STATUS VS TUMOR CHARACTERISTICS - PROGNOSTIC FACTORS FOR PRIMARY CUTANEOUS MELANOMA**

Authors: Stojanoski Sinisa, Manevska Nevena, Makazlieva Tanja, Miladinova Daniela

E-mail: [dr.nmanevska@gmail.com](mailto:dr.nmanevska@gmail.com)

Institute of Pathophysiology and nuclear medicine, "Acad. Isak S. Tadzer" Skopje, Macedonia

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**Introduction:** The aim of this study was to identify tumor characteristics of primary malignant melanoma predictive of sentinel lymph node (SLN) positive status and to determine whether sentinel lymph node status has an impact on disease recurrence and survival period.

**Material and Methods:** 80 patients (50±19 years; average Breslow score 1,9 mm; 33 males - 41,25% and 47 females – 58,75%) with primary malignant melanoma, staged T1b/T2 (1-4mm Breslow score) N0, M0 were analyzed. Univariate and multivariate analyses were performed to assess factors that predict SLN positive status, recurrence and survival period.

**Results:** We identified Breslow's thickness, Clark level, ulceration, lymphocytic infiltration and colloid uptake of SLN as independent predictors of SLN status. SLN status was a significant predictor of disease free survival.

**Conclusion:** Our study confirms Breslow's thickness, Clark level, ulceration, tumor lymphocytic infiltration and colloid uptake of SLN as factors predictive of SLN metastasis in cutaneous melanoma patients. We also confirmed SLN status to be the most significant independent predictor of disease free survival and risk of regional recurrence.

**Key words:** prognostic factors, recurrence rate, melanoma, sentinel lymph node biopsy.

## P033

### IS THE TIRADS SCORE ASSOCIATED WITH A SCINTIGRAPHIC ANALYSIS PREDICTOR OF THE PRESENCE OF THYROID CANCER?

Authors: Hadžiahmetović Miran, Cerić Š, Agić- Bilalagić S, Begović- Hadžimuratović S, Arnautović- Halimić A, Begić A

E-mail: [miran1989@gmail.com](mailto:miran1989@gmail.com)

Clinical Center University of Sarajevo- Clinic for nuclear medicine and endocrinology/Sarajevo/BiH

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#### Purpose

The aim of the paper is to show the correlation of the TIRADS score and the pathohistological findings of thyroid tissue. The combined TIRADS score with scintigraphic thyroid gland enlargement increases its sensitivity and specificity, as well as the positive and negative predictive value.

#### Materials and methods

A total of 50 patients with thyroid gland cancer have been included. All patients had hormonal status, antibody status, thyroid ultrasound, scintigraphy of the thyroid gland as well as fine-needle aspiration cytology (FNAC) . Evaluation of TIRADS promptly showed a recommendation for FNAC. Cytology has shown the presence or the possibility of the presence of thyroid cancer. After surgery, a suspicion of thyroid cancer has been confirmed.

#### Results

A total of 50 patients were analyzed. Of these, 40 (75.5%) are women, while 10 are men (18.9%). The age of the respondents is at least 29 years old when diagnosing the cancer, while it is maximum 85 years. There is no statistically significant difference in the incidence of cancer between males and females (94.3% vs 5.7%) [ $\chi^2$  (10) = 0.332;  $P > 0.05$ ]. The most common is the papillary carcinoma which was found in 28 patients (52.8%), while follicular carcinoma was found in 15 patients (28.3%). This difference is statistically significant (52.8% vs. 28.3%). Of the total number of confirmed thyroid carcinoma, TIRADS score showed 44 (88%) positive findings referring to thyroid cancer. This difference is not statistically significant [ $\chi^2$  (44) = 0.748;  $P > 0.05$ ]. Of the total number of patients, the scintigraphic finding showed a positive finding in 45 (84.9%) patients, while in 5 (9.4%) patients findings were negative. This difference is not statistically significant [ $\chi^2$  (50) = 0.109;  $P > 0.05$ ].

Sensitivity of TIRAD is 75.6%, while the specificity is 60.0%. The positive predictive value is 94.4%, while the negative predictive value is 21.4%.

The sensitivity of the scintigraphy is 93.3%, while the specificity is 40.0%. The positive predictive value is 93.3%, while the negative predictive value is 40.4%

#### Conclusion

The analysis showed that the TIRADS score associated with the finding of scintigraphy can show suspicion of thyroid cancer. A pathohistological finding has confirmed the suspicion of cancer.

## P034

### IS THE TIRADS SCORE ASSOCIATED WITH A SCINTIGRAPHIC ANALYSIS PREDICTOR OF THE PRESENCE OF THYROID CANCER?

Authors: Miran Hadžiahmetović<sup>1</sup>, Šejla Cerić<sup>1</sup>, Selma Agić<sup>1</sup>, Sadžida Begović- Hadžimuratović<sup>1</sup>, Ajla Arnautović- Halimić<sup>1</sup>, Amela Begić<sup>1</sup>

E-mail: miran1989@gmail.com

Clinical Center University of Sarajevo- Clinic for nuclear medicine and endocrinology

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#### Purpose

The aim of the paper is to show the correlation of the TIRADS score and the pathohistological findings of thyroid tissue. The combined TIRADS score with scintigraphic thyroid gland enlargement increases its sensitivity and specificity, as well as the positive and negative predictive value.

#### Materials and methods

A total of 50 patients with thyroid gland cancer have been included. All patients had hormonal status, antibody status, thyroid ultrasound, scintigraphy of the thyroid gland as well as fine-needle aspiration cytology (FNAC) . Evaluation of TIRADS promptly showed a recommendation for FNAC. Cytology has shown the presence or the possibility of the presence of thyroid cancer. After surgery, a suspicion of thyroid cancer has been confirmed.

#### Results

A total of 50 patients were analyzed. Of these, 40 (75.5%) are women, while 10 are men (18.9%). The age of the respondents is at least 29 years old when diagnosing the cancer, while it is maximum 85 years. There is no statistically significant difference in the incidence of cancer between males and females (94.3% vs 5.7%) [ $\chi^2$  (10) = 0.332;  $P > 0.05$ ]. The most common is the papillary carcinoma which was found in 28 patients (52.8%), while follicular carcinoma was found in 15 patients (28.3%). This difference is statistically significant (52.8% vs. 28.3%). Of the total number of confirmed thyroid carcinoma, TIRADS score showed 44 (88%) positive findings referring to thyroid cancer. This difference is not statistically significant [ $\chi^2$  (44) = 0.748;  $P > 0.05$ ]. Of the total number of patients, the scintigraphic finding showed a positive finding in 45 (84.9%) patients, while in 5 (9.4%) patients findings were negative. This difference is not statistically significant [ $\chi^2$  (50) = 0.109;  $P > 0.05$ ]. Sensitivity of TIRAD is 75.6%, while the specificity is 60.0%. The positive predictive value is 94.4%, while the negative predictive value is 21.4%. The sensitivity of the scintigraphy is 93.3%, while the specificity is 40.0%. The positive predictive value is 93.3%, while the negative predictive value is 40.4%

#### Conclusion

The analysis showed that the TIRADS score associated with the finding of scintigraphy can show suspicion of thyroid cancer. A pathohistological finding has confirmed the suspicion of cancer.

## **P035**

### **Our Experience with DaTscan**

Authors: Envera Tabučić<sup>1</sup>, Amela Begić<sup>1</sup>, Nusret Salkica<sup>1</sup>, Amra Skopljak-Beganović<sup>1</sup>

E-mail: [envera\\_65@hotmail.co.uk](mailto:envera_65@hotmail.co.uk)

University Clinical Center Sarajevo, Clinic for Nuclear Medicine and Endocrinology

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Diagnosis of Parkinson's disease and essential tremor is obliged. Many diagnostic tests cannot truly differentiate Parkinson's disease essential tremor. Radiopharmaceutical indicated for striatal dopamine transporter visualization using single photon emission computed tomography brain imaging to assist in the evaluation of adults with suspected Parkinsonian syndrome. The aim of this abstract is to present technologist experience in performing DaTscan study. Before setting up protocol we checked image quality with Anthropomorphic Head Phantom for DaTscan. We performed DaTscan on 17 patients: 10 female and 7 male patients. Every patient had been scanned with the same protocol our Clinic use: IV application in the range of 111 - 185 MBq I-123 loflupane, scanning time is 3-6 hours after application, distance between the detectors was 13-15 cm. Patient position is supine with head towards detectors. Scanning method is SPECT with FANBEAM collimators. Scanning duration is 30 secs per view. Number of views 60 with zoom of 1,23. Image matrix size is 128x128, energy window 159 keV. Every patient is prepared with thyroid blocking with potassium iodide oral solution or Lugol's Solution or potassium perchlorate 400 mg at least one hour before application. We included DaTscan in our routine clinical work. Our protocol is in accordance with European guidelines. Quality control showed good image quality for our physicians and referring physicians showed approval for DaTscan findings in Parkinson's diagnostic algorithm. After initial phase there has been increased interest in this diagnostic modality.

## P036

### ATR-IR AND RAMAN SPECTROSCOPIC CHARACTERIZATION OF p-SCN-Bn-DTPA AND p-SCN-Bn-1B4M-DTPA TRASTUZUMAB CONJUGATES

Authors: Sterjova M1,2, Džodić P2, Makreski P3, Janevik-Ivanovska E1

1 University 'Goce Delčev', Faculty of Medical Sciences, str. "Krstе Misirkov" No. 10-A, 2000 Štip, Republic of Macedonia

2 University of Niš, Faculty of Medicine, Department of Pharmacy, str. dr Zoran Đinđić 81, 18000 Niš, Serbia

3 Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss. Cyril and Methodius University, 1000 Skopje, Republic of Macedonia

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Introduction: As powerful and non-destructive techniques, Attenuated total reflectance-infrared (ATR-IR) and Raman spectroscopy provide valuable molecular structure information and are convenient for verification of any changes in the native state of proteins. The purpose of this experimental work is to determine the secondary structure of trastuzumab after conjugation with (p-SCN-Bn-1B4M-DTPA (2-(4-isothiocyanatobenzyl)-6-methyl-diethylene-triaminepentaacetic acid) and p-SCN-Bn-DTPA (2-(4-isothiocyanatobenzyl)-diethylenetriaminepentaacetic acid)) by applying of these two techniques.

Material and methods: The 10- and 50-fold molar excess of chelators were conjugated with pure trastuzumab and freeze dried to solid state. Vibrational spectroscopy (Raman and ATR-IR) was applied for further physico-chemical examinations of lyophilized non-labeled samples by directly applying under the laser beam of the instrument. The spectra of conjugated samples were compared with naked trastuzumab purified from commercial product Herceptin®.

Results: The presence of characteristic amide bands (amide I, II and III bands) in ATR-IR and Raman spectra have indicated of retained native IgG1 structure of the antibody principally composed of  $\beta$ -sheets. The same as pure antibody, Raman spectra of conjugates contain the characteristic amide I band at  $\sim 1670$  cm<sup>-1</sup> and amide III band (1230-1300 cm<sup>-1</sup>). IR spectra of the samples also correspond with naked antibody and contain the amide I (1700-1600 cm<sup>-1</sup>), amide II (1480-1575 cm<sup>-1</sup>) and amide III bands (1255-1244 cm<sup>-1</sup>) specific for secondary structure of the proteins.

Conclusion: No integrity changes, physicochemical and structural modifications of trastuzumab after conjugation approve retained  $\beta$ -sheet structure of the antibody and support the opportunity for further development of radioimmunotherapeutics and diagnostic products active against HER2 positive breast tumors.



# VENUE



## **Welcome to Sarajevo, capital and the largest city of Bosnia and Herzegovina !**

Sarajevo is a city in which even strangers can feel like home. Neither geographically expansive, nor characterised by large buildings, the city retains a particular, arresting charm with its abundance of busy cafés and abiding tradition of hospitality.

The city's breathtaking backdrop of seemingly endless hills and towering mountains have in a sense always isolated the city, creating a timeless world, which despite its seclusion has always kept its doors open to the rest of the world. Although Sarajevo is a capital city typified by the hustle and bustle of everyday life, it also possesses a unique ambience that seeps into the soul.

This city epitomizes a partial centuries-old struggle against outside influences combined with the absorption of these influences into one of the most diverse cultures in Europe. Indeed, few places on earth feature an Orthodox and a Catholic church, a mosque and a synagogue within easy walking distance of each other. If there were any city in Europe that effortlessly straddles east and west, it is Sarajevo. Here the Byzantine and Ottoman empires of the east and the Roman, Venetian and Austro-Hungarian empires of the west left an indelible mark through culture, traditions and religions. A walk through Sarajevo is a walk through its past. From the oriental Ottoman quarters lined with sweet shops, cafés and handicraft workshops, to the administrative and cultural centre of Austro-Hungarian times, Sarajevo encompasses the very best of both worlds. In Sarajevo, people have time for family and friends. It is often said that a man's wealth here is not measured in his material belongings but rather in his friendships.



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